BENSON ADVOCATES DIESEL-ELECTRIC DRIVE

NEW YORK SEATTLE

MOTORSHIP

Devoted to Commercial and Naval Motor Craft

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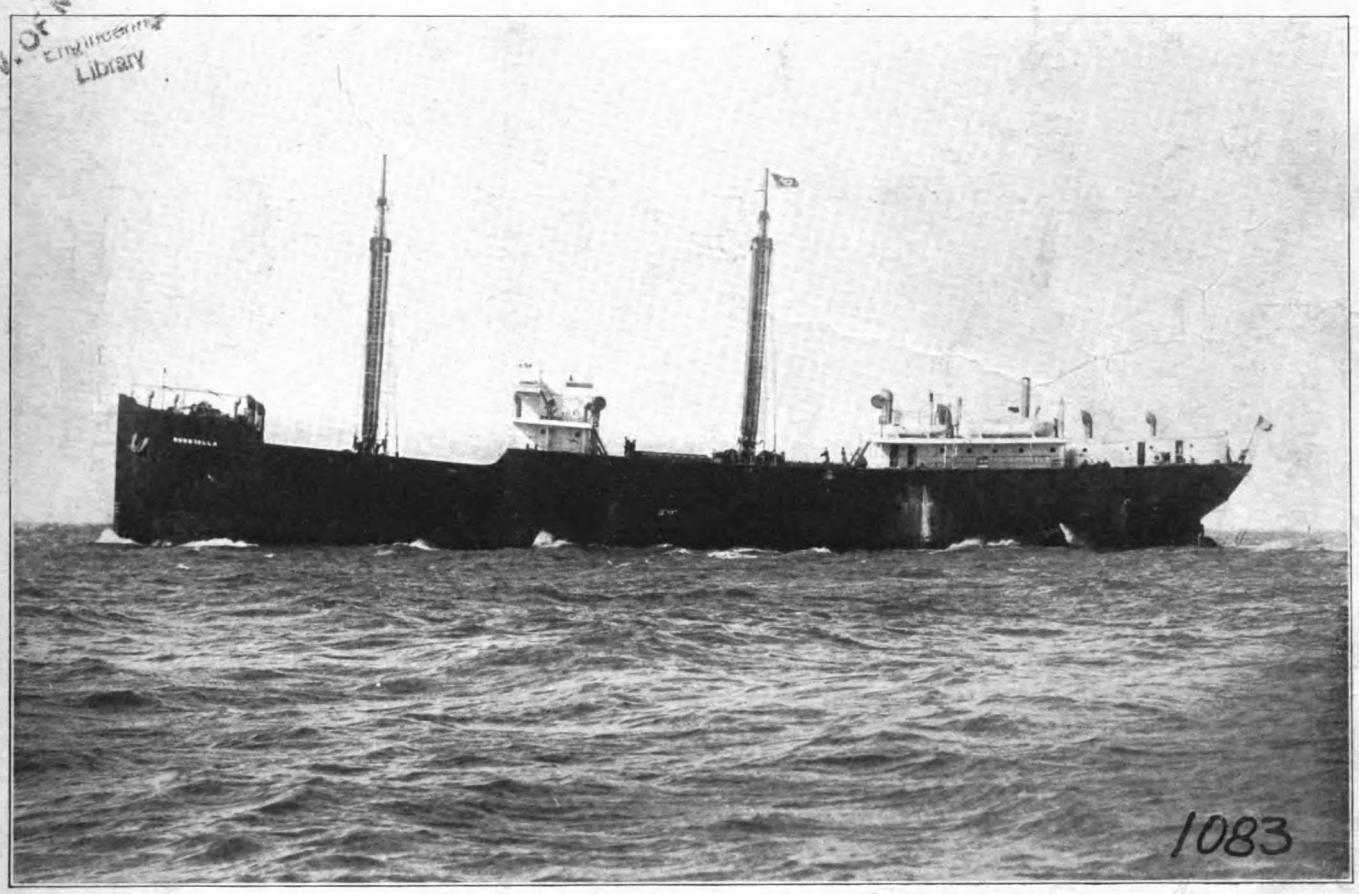

DIESEL MARINE ENGINES

FOR ALL CLASSES OF SHIPS

McINTOSH & SEYMOUR CORPORATION

AUBURN, N. Y., U. S. A.

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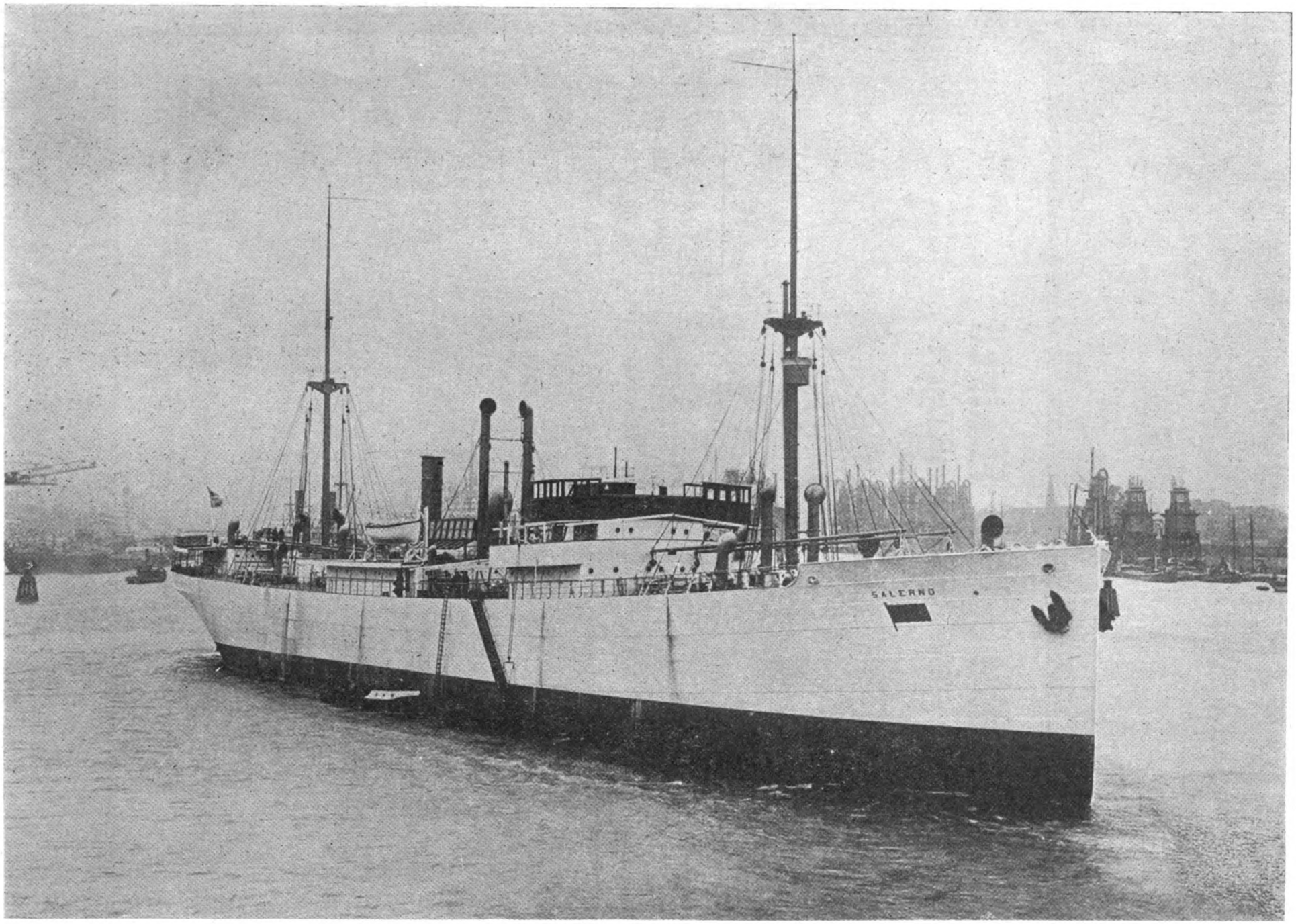

MODERN ECONOMICAL MERCHANT SHIPS No. 39

The motorship "SALERNO" first of a fleet of seventeen Werkspoor Diesel engined freighters building in Holland and Gt. Britain for Norwegian shipowners. She is of 9,700 tons displacement, 6,500 tons deadweight capacity, and has the following dimensions—length B.P. 375 ft., breadth 51 ft. 3 in., depth 25 ft. 6 in., draft 23 ft. 1 in., power 2,800 I.H.P. She was built for the Otto & Thor Thoresen Aktieselskabet of Christiania at J. K. Smit shipyard, Kinderdijk, Holland, and recently ran her trials, immediately leaving for South America. Twin, six-cyinder, four-cycle type 1,400 I.H.P. Werkspoor Diesel-engines are installed. A complete description and engine-room illustrations of the "SALERNO" will be published in our June issue.

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MOTORSHIP

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Australia—Gordon & Gotch, Sydney & Melbourne.

The oil-engined motorship has arrived! It is such a pronounced economy that it was bound to come. Nothing could stop it! And all obstacles have been removed as fast as they arose. The law of progress has seen to that. Very strong prejudices stood in the way of steam. But, one after another they were swept aside and steam reigned triumphant for a century. Steam now has had its day! Its zenith has passed, and gradually but surely it is being superseded by the economical internal-combustion power. Steamships are becoming decadent. America, the most important oil-producing country, is to be the greatest motorship-owning nation. Let us all co-operate and assist to make that day soon.

May, 1920 Vol. 5 No. 5

EDITORIAL

THE NEW WORLD

Why is it—a well-known American Diesel-engine builder recently asked us—a British shipowner has just placed an order with our associates in England for six large motorships in one contract without hesitation, while my own firm has met with strong opposition when endeavoring to secure an order for a single Diesel-engine from American shipowners, although our plant, experience and organization is equal to any across the Atlantic?

Frankly, we cannot put forth a reasonable answer. We are at a loss to comprehend the lethargic attitude of the average domestic shipowner towards the most modern and economical type of ocean-freight carrier, as it is so non-progressive and un-American. We could understand if this were the Netherlands, as the Hollanders are naturally very conservative, but here in the up-to-date U. S. A. it is a mystery beyond our conception. Waiting for the Government to declare a definite shipping policy can no longer be put forward as a logical reason, because the last six months have seen over a million tons of steam-driven ships ordered by private shipping interests.

Too often we have heard the remark, "Let the other man experiment first." Such a policy is extremely unwise from a business aspect, and will never assist to keep our new merchant-marine on the high seas in the face of competition from Europe and the Orient. Coming from the coast of Maine a few weeks ago, two shipowners were conversing in the "smoker" of the train. After listening quietly for a while we asked one of them why he had not adopted the Diesel-engined motorship—this without making ourselves known in order to get a candid opinion. His ready answer was—"let the other man do it first." Then we warmed up to the subject and let him have a few unvarnished truths. We believe that he had changed his views by the time we were through, as we did not mince words. As a matter of fact he admitted that if other sea-going nations were building numbers of motorships, American shipowners would be driven out of business if they stuck to steamships. At first, however, he raised doubts as to reliability, which were partly dispelled when his friend—who had been a sea-captain—told how he had skippered the first American full-powered steel motorship, and that she proved perfectly reliable in service.

THE OLD WORLD

Possibly it is unpatriotic to say so, but so far as the shipowning industry is concerned the title of this editorial and the title of the foregoing editorial could be transposed. We have just discussed the extraordinary indifference of the average American shipowner to the motorship, and we will now refer to the vastly different condition now existing in British shipping circles. Great Britain, the big coal country with world-wide bunker-coal stations, is building oil-burning Diesel-driven motorships—not by the dozen, but almost by the hundred, and to-day there is hardly an important shipbuilding company in England and Scotland who since the Armistice has not vigorously taken-up mercantile motorship and Diesel-engine construction. Particularly during the last six months has this state of affairs shown itself, and we only hope that American shipowners and shipbuilders will read the handwriting on the wall before it is too late.

As we write we have before us on our desk a copy of a letter from Vickers, Ltd., the great English naval shipbuilding firm, whose vast yards are now principally devoted to merchant shipbuilding work. On it we read *"Orders have been placed with us for* 16 *merchant-marine Diesel engines of* 1,250 *shaft h.p. each at* 110 *r.p.m."* We cannot help

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but exclaim—"Where is the American shipyard or engine-works that has received anything like a similar order? Why this lack of support to a splendid domestic industry, the success of which will mean so much to those American ship-owners who now do not seem inclined to move hand or foot to co-operate?"

The old established firm of Wm. Doxford & Sons, while offering both Diesel and steam ships to their patrons, frankly point-out the all-round superiority of the internal-combustion motor propulsion. On the other hand the various Harland & Wolff shipyards have completed fourteen large Diesel vessels, and according to Sir Marcus Samuel, are quietly launching a big motorship about every six weeks, avoiding all publicity. It is known that they have over 20 motorships from 8,000 to 16,000 tons d.w.c. on order, mostly for the Glen Line.

Many other old-established shipbuilding companies are actively engaged in Diesel-engined mercantile-motorship building and all on the following list have substantial orders on hand:

(1) Cammell Laird & Co., Birkenhead.
(2) Sir Wm. Armstrong, Whitworth & Co., Newcastle-on-Tyne.
(3) Barclay Curle & Co., Glasgow.
(4) Vickers, Ltd., Barrow-in-Furness.
(5) Harland & Wolff, Belfast,
(6) Harland & Wolff, Glasgow.
(7) North Eastern Marine Engineering Co., Newcastle-on-Tyne.
(8) Sir Wm. Beardmore & Co., Ltd., Dalmuir.
(9) Admiralty Dockyard, Chatham.
(10) Wm. Hamilton & Co., Port Glasgow.
(11) Ardrossan Dry Dock & Shipbuilding Co., Ardrossan.
(12) Swan, Hunter & Wigham Richardson, Ltd., Newcastle-on-Tyne.
(13) Hawthorn Leslie & Co., Newcastle-on-Tyne.
(14) Wood & Skinner, Newcastle-on-Tyne.
(15) Wm. Denny & Co., Dumbarton.
(16) Scotts Shipbldg. & Engineering Co., Greenock.
(17) Palmers Shipbuilding & Iron Co., Jarrow.
(18) Robert Duncan & Co., Scotland.
(21) J. Samuel White & Co., East Cowes.

Furthermore, the Fairfield Shipbuilding & Engineering Co. of Govan, Scotland, and John Brown & Co., Ltd., Alexander Stephen & Sons, of Linthouse, the Clyde Shipbuilding & Engineering Co., of Port Glasgow, all advertise marine Diesel heavy-oil engines, but we have not heard of any order placed with them, while Yarrows, Ltd., of Glasgow, for some time past have been negotiating for another Diesel license with a well-known European company. This gives a total of 24 British firms building motorships, apart from many French, Danish, Dutch, German, Swiss, Norwegian, Italian, Spanish and Swedish companies now building merchant marine Diesel engines and motorships, and it is not difficult to estimate that their combined total output of large ocean-going motorships in Europe during the next three years will exceed five hundred. According to a recent U. S. Consular Report 70% of the ships building in Sweden will have Diesel-engines, while S. O. Stray & Co., of Christiania, have just paid $240.00 per deadweight ton for three veteran motorships. Consequently, it is not surprising that a domestic Diesel-engine builder asks what is the matter with our shipowners!

BLIND HUSBANDS!!

—so runs the title of a recent "movie" picture blazoned across America in order to waken men into what is going on under their very noses. BLIND SHIPOWNERS should have been the title of the foregoing editorial, as the majority of the shipping-men in this country seem unable to see or realize that they are slowly, but surely, losing their recently gained positions in international ship operating, and that unless they quickly change their attitude towards the economical motorship our (at present) large merchant marine soon will be almost defunct and our obsolete steam craft sold to other nations or scrapped as junk.

THE DIESEL-ELECTRIC DRIVE

For a couple of years the question of Diesel-electric drive for the propulsion of merchant ships has been not a little prominent, and has been discussed in detail in the columns of "Motorship" by prominent engineers. Its successful use for engine-room auxiliaries, trawlers, yachts, and the satisfactory results of electric propulsion of battleships, has brought the Diesel-electric drive into the center of the limelight. As will be seen elsewhere in this issue, Admiral W. S. Benson, Chairman of the U. S. Shipping Board, has publicly announced his belief in this system of propulsion, and will arrange for the Shipping Board to adopt the Diesel engine and the electric drive. Lately a number of important companies, including the General Electric Co., Westinghouse Electric Co., Submarine Boat Corp., New London Ship & Engine Co., Winton Engine Works, and the Mallory Steamship Co., have been closely investigating the subject, and a considerable number of merchant motorships of this type have been planned.

Undoubtedly the subject has become one of great importance. Particularly does the Diesel-electric drive lend itself to the conversion of our uneconomical, fuel-wasting steamships, as it permits the installation of high power in single-screw ships without structural changes to the hull; also in many cases it will be possible to retain the existing propeller and shafting.

THE MERCHANT MARINE EXPOSITION

Exhibitors and the public alike expressed the opinion that the National Marine Exposition, held at the Grand Central Palace, under the auspices of the National Marine League, was an overwhelming success, and undoubtedly should be repeated in other years, with a view to maintaining public interest in our mercantile marine. The dinner of the League at the Hotel Commodore also was a success, and Admiral W. S. Benson, Chairman of the U. S. Shipping Board, made it the occasion of advocating the use of the Diesel-engine in conjunction with electric drive, regarding which more is to be found elsewhere in this issue. Unfortunately, "Motorship" has not sufficient space to deal with the many interesting exhibits in detail; but various new designs of marine machinery that were exhibited will be technically dealt with in future issues. We are extremely reluctant to state that only a few marine oil-engine builders were represented, whereas they should have been there in their full strength as advocated by ourselves. Here was the case of Admiral Benson urging the adoption of Diesel engines, but none was in view for the public to see. At "Motorship's" booth was a display of enlarged photographs of modern motorships of various types.

AMERICAN DIESEL ENGINE BUILDERS, PLEASE GET BUSY

A contract for ten 10,000 tons d.w. tank steamers has been awarded to a new company which, headed by David Rogers, purchased the No. 2 Skinner & Eddy plant at Seattle from the Emergency Fleet Corporation. We understand that the Irving National Bank are at the back of the shipbuilding deal. We take the opportunity to urge all American Diesel-engine builders to co-operate and induce the American Fuel

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Oil & Transportation Company to install Diesel engines in all or most of these ships, and so conserve America's oil supply. Also, American engine builders should endeavor to induce the Sinclair Oil Company to install oil-engines in its new fleet of tankers.

MEETING THE OIL SITUATION

Practicability of Converting Oil-Fired Steamers to Diesel Power

Last month we commented on the scandal of the present oil situation, but we presume that it is of little avail crying over spilt milk, and the best thing is to strive and meet the situation that exists. American steamships, and many of the foreign steamships that call at our ports, are consuming an enormous quantity of fuel-oil each month, nearly 90% of which is absolutely wasted up the smoke-stacks, and represents valuable energy which never can be recovered. There is, however, no tangible reason why this wicked waste should continue.

To convert these vessels into coal-burners offers no solution to the present conditions, as it would mean that the price of bunker-coal would increase, and the price of oil would drop, and the shipowner would be in an even worse position to meet foreign shipping competition, and cheaper fuel-oil would be available to economical European Diesel-driven motorships.

Only a few days since a case was brought before our attention where an American shipowner six months ago purchased a new oil-fired 10-knot steamer of 7,800 tons d.w.c. and is operating her on the New York-Cuba, etc., route, carrying coal, etc., the distance of the round voyage being about 3,000 nautical miles. Owing to the oil shortage he has lately been paying $6.09 per barrel, so the fuel-bill comes to the teriffic amount of over $1,200.00 per day, as the daily consumption is from 26 to 30 tons.

If he converts this ship to Diesel power, it cannot be done for several months, as owing to the poor support and encouragement given by American shipowners to domestic Diesel-engine builders, there is only one motor of the desired power, namely 2,500 h.p. available within the next few months, also it will mean the ship being held in port for six to eight weeks while the conversion is being made.

But, if it is done, the fuel-consumption and bill of the ship will be reduced to about 7½ tons, or $314.00 per day with fuel at the same price per barrel, and the ship will carry 600 tons more cargo on the outward trip and about 400 tons more cargo on the return passage.

As the time spent at sea is about 13 days, the saving in fuel alone will be $11,518.00 apart from the 4 tons of fuel saved every day the ship is in port. What the value of the 1,000 additional tons of cargo carried each round voyage is we can leave to shipowners to figure for themselves.

There is another matter to be studied, and that is the oil-supply and the class of oil used by motorships. Hitherto the difference in the cost of heavy, residual-oil fuels and light, clean, residual-oils has been so slight that it paid motorship-owners to purchase the cleaner and more expensive fuel, as it did not make $25.00 per day difference in the fuel-bill, because a 10,000 tons Diesel vessel only uses about 60 barrels a day. But, with the changing conditions it is becoming more desirable to use the heavier grades of oil with motorships, not only because of the price, but because some of the oil-companies are only carrying one grade of fuel at out-of-the-way stations. True it is that the average ocean-going motorship carries sufficient fuel for 25,000 nautical miles, and can pick-up oil where it is the cheapest, but sometimes thro' carelessness or other reasons she will run her bunkers dry in districts where light fuel-oil is scarce.

Hence, she must be prepared to use whatever grade of fuel-oil is obtainable anywhere in the world. Ship-builders when making the Diesel engine installations must ensure that the bunkers in the double bottoms are equipped with heating-coils in order to break-up the viscosity of thick oils, and warming apparatus must be arranged between the day tanks and the engines, and large size pipes and pumps fitted everywhere, in order that the fuel may flow freely. Also the injection-valves and fuel-pumps must be easily adjustable to handle varying fuels. With these features properly taken care of there will be no trouble in using the heaviest of liquid fuels obtainable, unless the sulphur exceeds say 5% and unless ash is too excessive. Asphaltum in large quantities will burn in the engine cylinders with practically no trouble. Asphaltic oils can be produced at prices 50% less than light distillate oils.

Vital Importance of Economical Use of America's Oil Supply

Evidence Before U. S. Senate Committee on Commerce Shows the British-Dutch Interests Control World's Production of Oil

[If the following evidence is true, and our information from other sources leads us to believe that it is based on solid grounds, the future U. S. bunker-oil situation is most serious and the desirability of immediately economizing the use of fuel-oil is apparent, as is the importance of all American oil-companies keeping a list of their bunker-fuel stations before our readers. Nearly all existing American steam-driven tankers and freighters up to 16,000 tons d.w.c. should be converted to economical Diesel power as rapidly as feasible, and all new vessels up to that size undoubtedly should be motorships. Otherwise we soon may be dependent upon foreign companies for our bunker-oil supply.—*Editor.*]

Statement of Admiral R. E. Coontz

(*Continued from page* 330, *April,* 1920, *issue* of *"Motorship"*)

SENATOR CHAMBERLAIN—What department of our Government could give us information with reference to the acquirement by the British Government, for instance, of these oil-fields?

ADMIRAL COONTZ—My department, Senator; and I will be very glad to put it in the hearings. I have what is known as the logistic department.

SENATOR CHAMBERLAIN—I really think the most serious situation with reference not only to our Navy, but our merchant-marine, is the oil and coal situation and our facilities for bunkering and getting oil.

I have heard it mentioned on the floor of the Senate, and my attention has been called to it again, that the British Government, for instance, have acquired the Royal Dutch-Shell interests of Holland, and they are developing properties in India, Java, Persia, Russia, Roumania and other parts of the Old World. Do you know anything about that? Have you any data on it?

ADMIRAL COONTZ—Yes, sir.

SENATOR CHAMBERLAIN—Could you give it to the committee?

ADMIRAL COONTZ—Yes, sir.

Statement of Mr. Judson C. Welliver

(Washington Correspondent of the New York Sun)

MR. WELLIVER—The Royal Dutch company is a concern whose capitalization today is stated to include a group of companies that are concerned together, probably at a half-billion dollars. It is a combination quite comparable to the Standard Oil in power and also financially. It appears to be very little understood in this country that the Royal Dutch Shell also is very strong in this country. Through the Roxana Oil Co., which is one of the largest primary producers here, it has very heavy interests in Texas, Oklahoma, and through that or other concerns, in Kansas, and I am informed in Wyoming, and very large interests in California, and, generally, it is deeply interested in the producing companies of the United States. There are a considerable number of their companies here.

Geologists and oil-experts have recently

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that if the oil kept going up very much that coal will be cheaper than oil, and that we will rather go back from the use of oil in shipping to the use of coal.

MR. WELLIVER—I suppose that is perfectly obvious.

SENATOR RANSDELL—A shipping man said to me the other day, that you can get oil out of coal. In fact, he intimated that oil could be made out of coal and used in the Diesel-engines in competition with oil and its products successfully.

MR. WELLIVER—I suspect that is true. Almost everything can be made out of coal.

SENATOR RANSDELL—He was speaking of it as a commercial possibility.

MR. WELLIVER—Mexico is widely regarded as the next greatest producer of oil, perhaps the greatest producer for the next couple of decades, and in Mexico the best information I have, supplied by oil people, indicates that the Royal Dutch-Shell Co., which is everywhere very powerful in the Tampico region and in other parts of Mexico, and that the Pearson-Cowdrays interests, also British, are by way of approaching the domination of a very large part of the Mexican supply. It is true that the United States is in Mexico very strongly. The Mexican Eagle Oil Co., which, I believe, is the largest single producer in Mexico, has recently announced in the British newspapers, and I think I have seen it in American newspapers also, has passed under the control of the Royal Dutch-Shell combination.

So to one who follows oil discoveries from day to day, it appears that the Royal Dutch combination is seizing the sources of original supply of oil. And that company's control is distributed throughout the world in that way. This is the thing, I think, that concerns you gentlemen of this committee that this oil control is distributed throughout the world, in the Caribbean Sea, Australia, the East Indies, the south of Russia, and Mesopotamia, in Africa, and also the east and west coasts of Africa. Everywhere the British shipping will always be within sight of oil. American ships will not. That is a definite showing that the coaling and oiling stations scattered throughout the world are absolutely controlled. That is extremely important as showing just what we face now.

England has always hauled coal overseas to equip her own coaling stations because it provided cargo. Now, by way of developing a world system of production of oil and of the maintenance of oiling-stations everywhere and with the control of the field supply, we may also anticipate that England will use these to the general advantage of British commerce; while it is true that American ships may coal and they may oil at British stations the world over, nevertheless in an exigency when the privilege is necessary, it will not be so readily accessible. That has been the discovery of Great Britain's competitors at all times, and it is a perfectly obvious situation. We would do the same thing ourselves. I do not think there is anything more I can say about the subject.

THE CHAIRMAN—Have you any suggestion of action that we could take or that this committee can take?

MR. WELLIVER—This committee might inform itself as to the present oil situation in Mexico and the probability that developments will be permitted soon in Mexico.

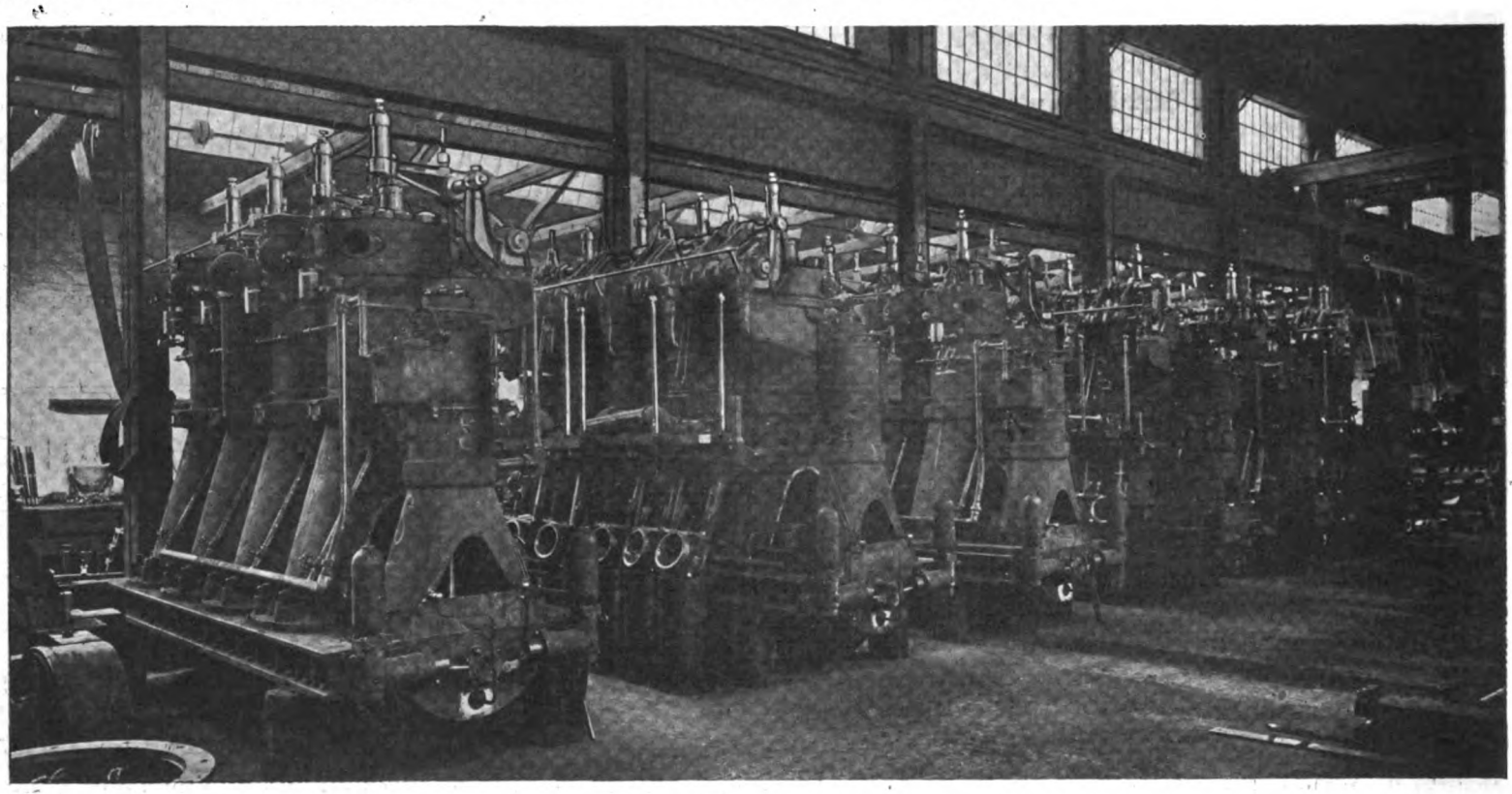
SENATOR RANSDELL—Has there been any oil developed in the Philippine Islands?

MR. WELLIVER—Yes, sir; and it is in the control of the Royal Dutch-Shell, mostly. That fact I discovered with some interest from a British parliamentary publication. *The Royal Dutch-Shell undoubtedly has today the control of the world's oil future.*

THE CHAIRMAN—Are we not exporting a great deal of oil?

MR. WELLIVER—During the war we exported considerable oil, but our exports of oil in the year 1919 were so much less than our imports of oil from Mexico that the balance represented a net importation for the year of 38,000,000 barrels.

The greatest oil-field in the world is supposed to be in the island of Java, a field whose extent I do not know, but just from my rather vague recollection of my inquiries about it, it is presumed to be the greatest oil-field in the world, so great that I have heard it stated that the product of our midcontinent fields at their greatest would hardly be worth a comparison with what this Java field will produce when it is ultimately developed. The Royal Dutch and the Standard Oil both made quite remarkable offers for it under the royalty plan, and ultimately the Dutch Government became so impressed with the desirability of keeping the field in its own possession that it set the most of the field aside, as a great oil-reserve, which is intended to be maintained in perpetuity as the property of the Dutch Government.



A series of 160 shaft H.P. Holeby Diesel engines under construction at the Danish Diesel Motor Works for motor-auxiliary sailing-ships building at the Rodby shipyard, Rodby, Denmark

TWO DANISH MOTORSHIP COMPANIES TOGETHER MAKE A PROFIT OF 121,586,924.00 KRONERS

Last year the Det Forenede Dampskibsselskab (United Steamship Company) of Copenhagen, Denmark, made a profit of 68,000,000.00 krs. Of this amount 30,000,000.00 krs. were paid in taxes at home and abroad. 16,000,000.00 krs. were carried to reserve funds and a dividend of 60 per cent declared. This well-known Danish Shipbuilding company are strong believers in the motorship, and among their vessels are the motorships "California" and "Oregon." At the time of writing the motorship "Oregon" is in New York Harbor, loading American products that should be carried abroad in the hulls of American motorships.

The second Danish motorship owning company to declare an enormous profit is the East Asiatic Company, which operates motorships exclusively, having sold all their steamers to the Orient Co. Incidentally, it is of interest to relate that the Orient Company also have motorships on order. The East Asiatic Company's profits for 1919 were 53,586,924.00 krs. of which about 15,000,000.00 krs. were paid in taxes. 5,000,000.00 krs. were carried to reserve funds and a dividend of 40 per cent was declared.

CONCRETE MOTORSHIP OF 1300 TONS D.W.C. LAUNCHED

Sister Motorship Now Under Construction

The concrete motorship "Triton" has been launched from the yard of the Codan Shipbldg. Co., Koge, Denmark. She is a sea-going vessel of 1,300 tons d.w.c., and is propelled by a 400 h.p. Frichs Diesel-engine. Her owners are the Triton Shipbuilding Co., Copenhagen, Denmark. 160 tons of steel was used in the construction of this concrete ship, and it is interesting to state that a sister Diesel motorship for the same owners is almost finished on the adjoining slip to which the "Triton" was launched.

592 DANISH MOTORSHIPS IN SERVICE

According to official figures there are now 516 motorships and 592 sailing-vessels of 118,276 gross tons in the service of the Danish merchant marine.

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"Fabia," A New Diesel-Driven Trawler

Gloucester Fisheries Company Take Delivery of Nelseco-Engined Vessel

RELIABLE operation and economy of the several heavy-oil engined trawlers in service on the East Coast have been the means of causing fishing-vessel owners to order additional craft of this type. Some have Diesel-electric drive, others direct-Diesel drive, and some have surface-ignition oil engines. Of the direct-Diesel drive is the "Fabia," a new beam-trawler recently completed for the Gloucester Fisheries Co. of Gloucester, Mass., by Frank Rice of East Boothbay, Me.

The principal dimensions of this vessel are:

Length (O. A.)	142 ft.
Breadth	24 ft.
Depth of hold	14 ft.
Capacity	300,000 lbs. fish
Power	360 shaft h.p.
Type of engine	Four-cycle Diesel
Propeller (Hyde 4 blades)	6 in. dia. by 5 ft. 6 in. pitch

She is heavily constructed of white-oak frames, deck-beams and planking; while the ceiling, keelsom and bilge are of yellow pine, as is the deck which is diagonally laid with two courses of yellow pine with a 3 in. white pine deck laid fore and aft on top, making a 3 ply deck. The deckhouse is of steel with a pilot-house above. Aft of the pilot-house is the captain's room with the mates' and the engineers' staterooms aft the engine-room on the main deck. There is a motor-room housing the electric motors, which operate the fishing windlass, in the fore end of the deckhouse, the galley and mess-room being at the aft end.

To readers of "Motorship" the engine-room will be of the greatest interest. This contains a 6-cylinder, 13 in. x 18 in., 360 shaft h.p. Nelseco Diesel-engine built by the New London Ship and Engine Company. This turns a four-bladed Hyde propeller of 6 ft. diameter by 5 ft. 6 in. pitch. For auxiliary purposes there is a Nelseco air compressor which charges 9 steel bottles each of 5 cu. ft. capacity and this compessor will charge any one of these bottles to 800 lb. pressure in 8 minutes or the entire set in 72 minutes, the latter forming sufficient air to maneuver the main engine 30 times.

For furnishing current for lighting the vessel, there is a 12½ h. p. Burnoil engine belted up to a 110 volt Westinghouse generator. The generator also charges 86 Edison storage batteries. Another use to which this Burnoil engine is put is that of driving a Gould centrifugal pump that has a capacity of 120 gals. per minute. The latter is used as a bilge-pump, drawing from all compartments and discharge outward, also for washing down decks, and can be used as a cooling water circulating-pump for the main engine in the event of emergency.

There are ten fuel-oil tanks arranged in various parts of the ship and in addition to carrying 300 bbls. of fuel-oil they keep the ship in trim. For transferring fuel-oil to the different tanks there is 1½ h.p. Kinney pump. For carrying lubricating oil there is a 500 gal. tank and this tank is filled and emptied by an electric-driven Kinney pump installed in the aft end of the engine-room, while the oil is cooled by a Schutte & Koerting oil-cooler before passing to the bearings. For filtering the fuel-oil there is an oil-strainer manufactured by Sage Bros.

As may be expected, the fishing windlass is electrically-driven. It is located on the main deck just forward of the deck-house. The current for this windlass is derived from a 66 K.W. 230 to 250 volt Fairbanks-Morse electric generator which is driven by a 2-cylinder 14 in. x 17 in. Fairbanks-Morse 100 h.p. surface-ignition oil engine at 257 R.P.M. It is direct connected and the generator also furnishes current for the auxiliary air-compressor.

In order to clean all lubricating-oil after it has been circulated, there is a De Laval oil-purifier of 140 gal. per hour capacity and this is driven by ½ h.p. electric motor. No expense has been spared to make the "Fabia" one of the finest fishing vessels on the Atlantic Coast. She left her builder's yard on March 24th, and cruised to Gloucester where the finishing touches were put to her. Capt. Robert Wharton is in command, while the engine-room is in charge of Chief-engineer Leslie Mailloch.

Launch of the Diesel-driven trawler "Fabia" at the Rice yard, East Boothbay, Me.

SHIPBUILDERS CONSTRUCT DIESEL LOCOMOTIVE

Hawthorn, Leslie & Co., Ltd., Newcastle-on-Tyne, England, who recently acquired Werkspoor Diesel engine license with a view to extensive construction, are also developing an internal-combustion locomotive.

DIESEL-ELECTRIC DRIVE

It is reported that the General Electric Company are working on plans for one dozen motorships to be equipped with Diesel-electric drive. So far as we are aware no order has yet been placed for the same.

NEW MOTORSHIP FOR THE TEXAS CO.

We recently had the pleasure of inspecting the new motorship "Solitare", built by the Texas Steamship Co., Bath, Me., for the Texas Co. of New York. She is a tanker of 4,500 tons d.w.c., and is propelled by two McIntosh & Seymour Diesel engines of 500 h.p. of 630 I.H.P. Full details and illustrations will appear in the June issue of "Motorship." Her speed on trials was 9⅛ knots.

CARGO FIRE ON MOTORSHIP "TISNAREN"

When lying in the roads of Sourabaya, Java, the 9,400 tons motorship "Tisnaren" caught fire from self-ignition of her copra cargo, and some of the hulls were burned out. She had to be run ashore on the Madoera side and the damaged cargo was sold by auction. Later the ship was removed to the docks, and we are glad to say that the damage was not so serious as was first thought, so she sailed back to Scandinavia under her own Diesel power for a general overhaul.

MOTORSHIP "BOOBYALLA'S" MAIDEN TRIP

We understand that the wooden motorship "Boobyalla" of the Chilberg Line, Seattle, Wash., recently cruised from Seattle to San Pedro in 6 days and returned to San Francisco within 42 hours without any trouble whatever, and with full cargo both ways. This was her maiden voyage. She is equipped with twin McIntosh & Seymour four-cycle type Diesel engines of 630 I.H.P. each, which drive her at a speed of 8.58 knots on a daily consumption of 32 bbls. of fuel-oil, and 10.4 gals. of lubricating-oil. She is a freighter, but has a lumber capacity for 1,600,000 ft. Diesel-electric auxiliaries are fitted throughout. She has just been purchased from J. E. Chilberg, of Seattle, by the Pacific Freighters Co., for $475,000.00.

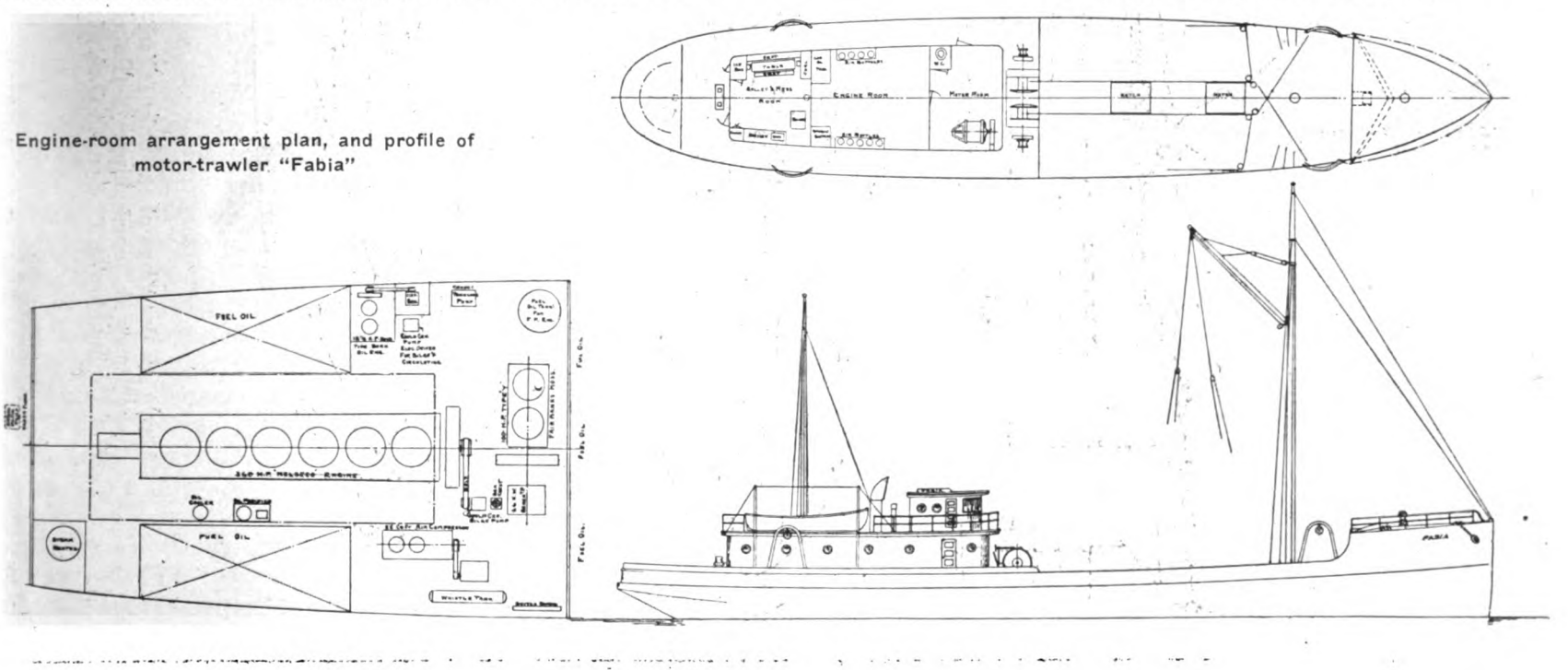
THE REDERIAKTIEBOLAGET TRANSATLANTIC ORDER BIG MOTORSHIP FROM ENGLAND

When Will American Shipowners and Shipbuilders Wake Up?

In addition to their three 9,400 tons d.w.c. motorships now in service, and five more on order with the Götaverken of Göteborg, Sweden, the Rederiaktiebolaget Transatlantic of Göteborg have ordered a large single-screw cargo-passenger motor-vessel from Wm. Doxford & Sons, in which the new Doxford two-cycle type opposed-piston Diesel-engine will be installed and which will have solid-injection of fuel. The vessel has the following dimensions:

D.W.C.	10,800 tons
Length	420 ft.
Breadth	54 ft.
Depth	29 ft.
Draught	25 ft.
Horse-power	3,000 shaft
Propeller speed	77 R.P.M.
Ship's speed	12 knots

Reference was made to this engine in the November, 1919, issue of "Motorship."



Engine-room arrangement plan, and profile of motor-trawler "Fabia"

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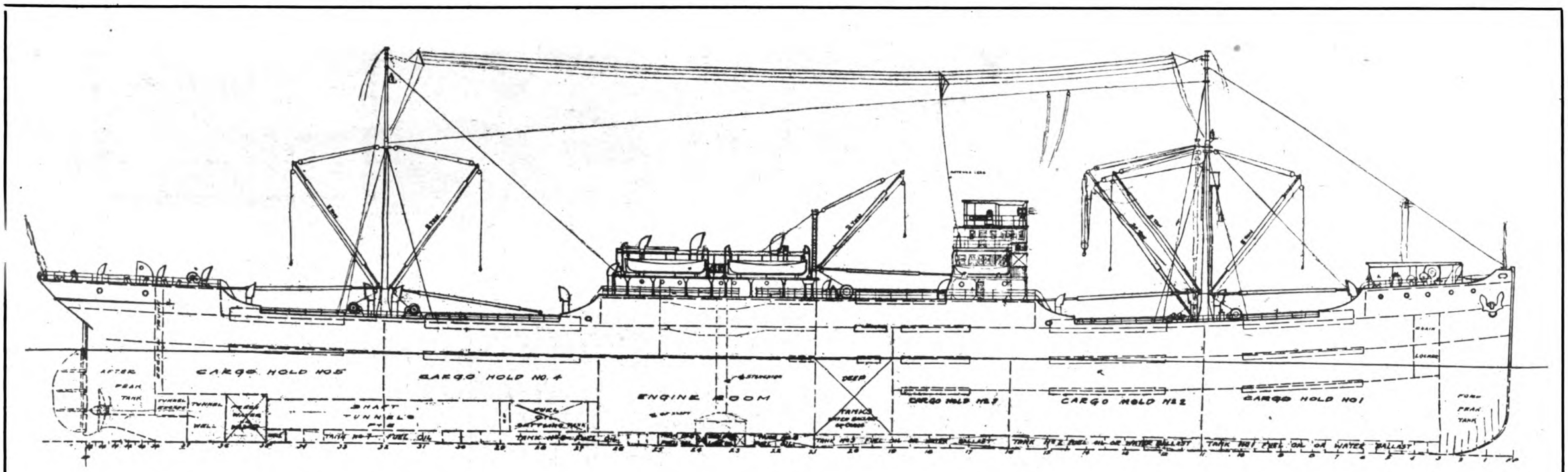

THE U. S. SHIPPING BOARD'S ONLY MOTORSHIP

Above are drawings of the only Diesel-driven motorship ever ordered by the U. S. Shipping Board. She is of 12,900 tons d.w.c. and is nearing completion at the Pusey & Jones shipyard, Gloucester City, N. J. Twin 2250 I.H.P. Burmeister & Wain four-cycle-type Diesel-engines are to be installed at the Wm. Cramp shipyard. Length O. A., 455 ft.; length B. P., 439¼ ft.; breadth, M., 60 ft.; depth, 30 ft. 8 in. Displacement, 17,200 cubic ft.; capacity of holds, 555,320 cubic ft. Speed, 11 knots. Daily fuel-consumption at sea, 13 tons.

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Benson Advocates Diesel-Electric Drive

Chairman of U. S. Shipping Board Points Out Importance of Economical Power and Announces That Board Will Adopt Diesel Engine and Diesel-Electric Drive

DECLARING that the performance of the electrically-driven ship in the United States navy had proved the efficacy of this power, Admiral William S. Benson, Chairman of the U. S. Shipping Board, publicly announced at the ninth annual dinner of the National Marine League, held at the Hotel Commodore, New York, on Tuesday night, April 13th, that he proposed to develop the electric drive and the Diesel oil-engine during his administration. He also urged the support of all Americans to the U. S. merchant marine.

Approval and appreciation were expressed by the great audience in the vast ball-room when Admiral Benson warmed-up to his address upon coming to the subject of fuel-economy and the development of motive power. He said:

"It is my intention, as Chairman of the Shipping Board, as soon as we can get rid of some of the pressing problems, the disposing of the ships and this surplus material, to devote the attention of the Board for what it was originally intended, to safeguard our interests, looking out for the places where our foreign competitors are cutting in by propaganda by lobbying bills through Congress, or any other means whatever to injure or to weaken our supremacy on the sea.

"I believe that we must develop a better motive power for our ships. My own thought is this: We know the effectiveness of the Diesel engine, and its economy, and my present intention is to try to develop the same principle in the electric generator and to use the electric power as the motive power for driving the ships; in other words, the electric drive. We have demonstrated in our battleships that the electric drive is much more economical than the ordinary turbine engine. It was my privilege to combat the opposition to the turbine drive and to make it permanent in our battleships.

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ADMIRAL W. S. BENSON
Chairman U. S. Shipping Board, who advocates motorships for America's merchant marine

"If the electric drive is more economical than the ordinary turbine engine, we all know that the Diesel oil engine is much more economical than the ordinary method of driving ships, if we can get that installed and develop it, and I am using every effort that I can to develop the Diesel principle to the electric generator, and then using the electric current, which is no longer an experiment, for driving the ship.

"You gentlemen who are practical ship-operators, if you think, will realize the tremendous waste of power, weight, room and everything, in the various auxiliaries aboard our ships. We must do away with those. We must use something, and I believe the electric power is the thing that will do it, for all of our auxiliaries aboard ship, all of these little things must be looked after. We must save every pound of coal, every gallon of fuel-oil, that we possibly can, and when I say coal I say it with a good deal of regret, because our competitors will try to persuade you that we must go back to coal burning—that we cannot get oil in all parts of the world, or that it doesn't pay, or something of that kind. Gentlemen, *if you ever give up fuel-oil in the modern times, unless you can get something better, you might as well take to the woods and cut wood for your fuel. You can't compete with foreign competitors on any other basis.*

"Gentlemen, I feel this thing most seriously, and I mentioned some of these things simply to rouse your interest, because this is not a ship-owners', it is not a ship-builders', nor is it a sea-faring proposition; it is an American proposition, and it appeals to every American citizen. And I come to you tonight as an American citizen, realizing the importance of the great problem that is facing us.

"It is necessary for us to have a merchant marine in which we can carry our surplus products to foreign countries. We need it in our national defense. We need it in every phase of our life, and now, at the close of my professional career, and accepting this position as Chairman of the United States Shipping Board, I appeal to you, and through you to every American citizen, to give us your earnest, your sympathetic and your constructive support.

"Furthermore, in view of the international situation that existed throughout the war, every encouragement should be given to the control and use of the radio service by the government under the navy, which has proven so effective and so useful to the commercial interests, not only during the war, but since the Armistice."

Among other speakers was Captain Irving L. Evans, Director of the Recruiting Service of the United States Shipping Board.

He said: "We are now training men experienced on reciprocating engines, in the operation and repair of marine turbines, including the electric drive. We have trained a few on Diesel-engines, *but stopped on account of the lack of demand for men so trained.* However, it is my opinion that we will again have to resume this training, because the internal combustion engine is undoubtedly destined to play an important part in the future success of our merchant marine.

"We now have an American Mercantile Marine. I am confident that it will succeed because it is going to be manned by Americans and backed by the citizens of this country. The time has come when the American people must realize that if the wonderful growth and prosperity of this country is to continue and endure, American ships, manned by Americans, must carry our commerce to the ports of every nation whose shores are washed by the salt seas."

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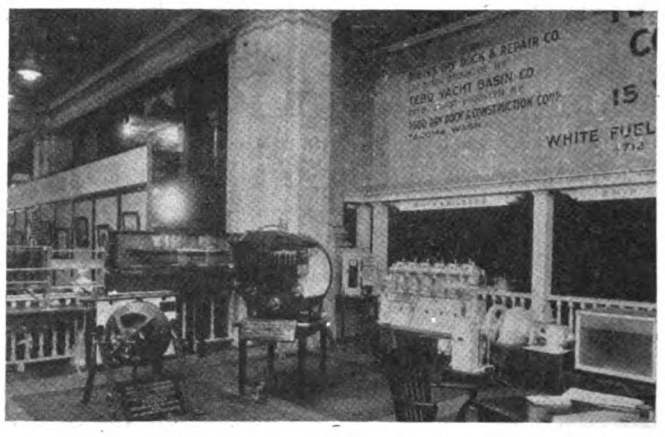
THE NATIONAL MERCHANT MARINE EXPOSITION

The working model of the Morse Dry Dock Co.'s plant, and the fine model of the S.S. "Mauretania."



Todd Shipyards Corporation exhibit showing model McIntosh & Seymour Diesel-electric drive set.

Engine-room equipment at the Chadburn Booth.

The Downey Shipbuilding Corporation's Booth.

General view of the main floor at the National Merchant Marine Exposition

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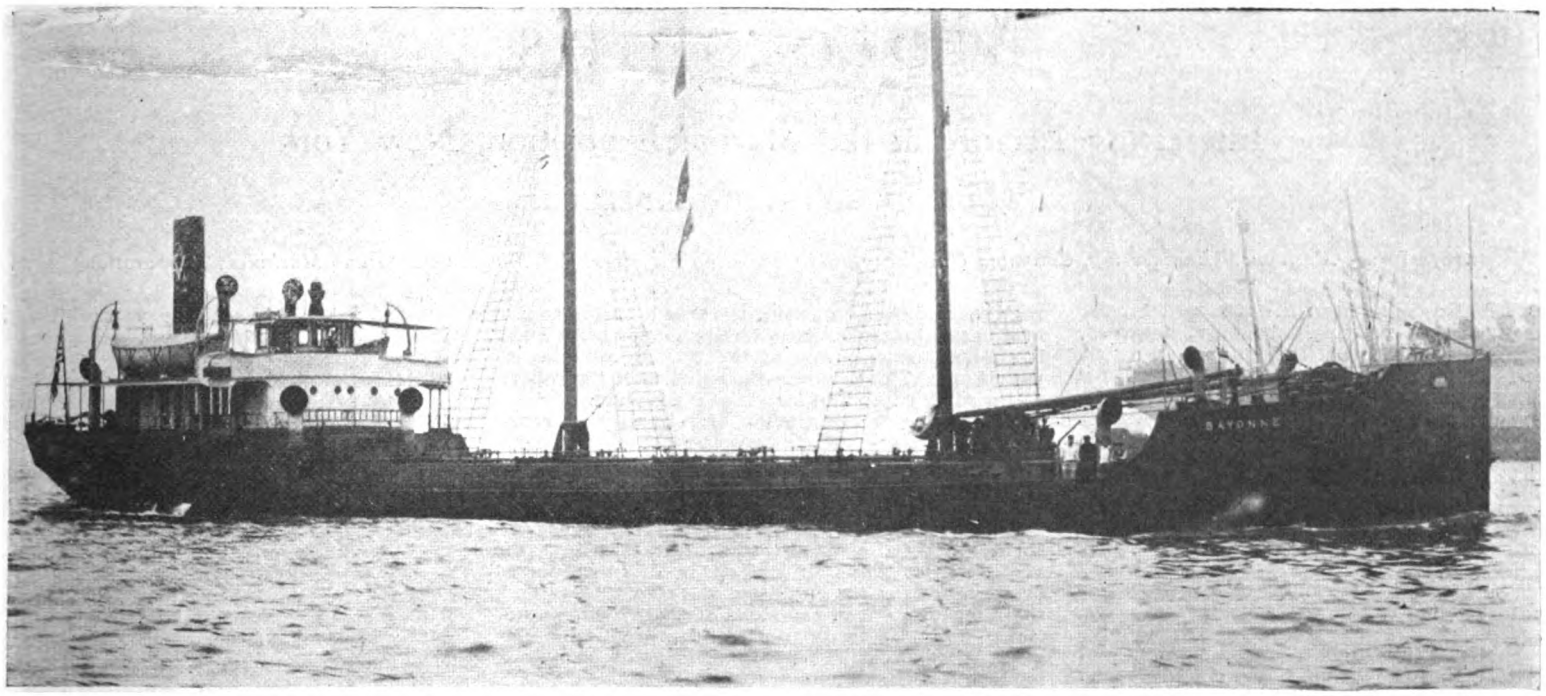
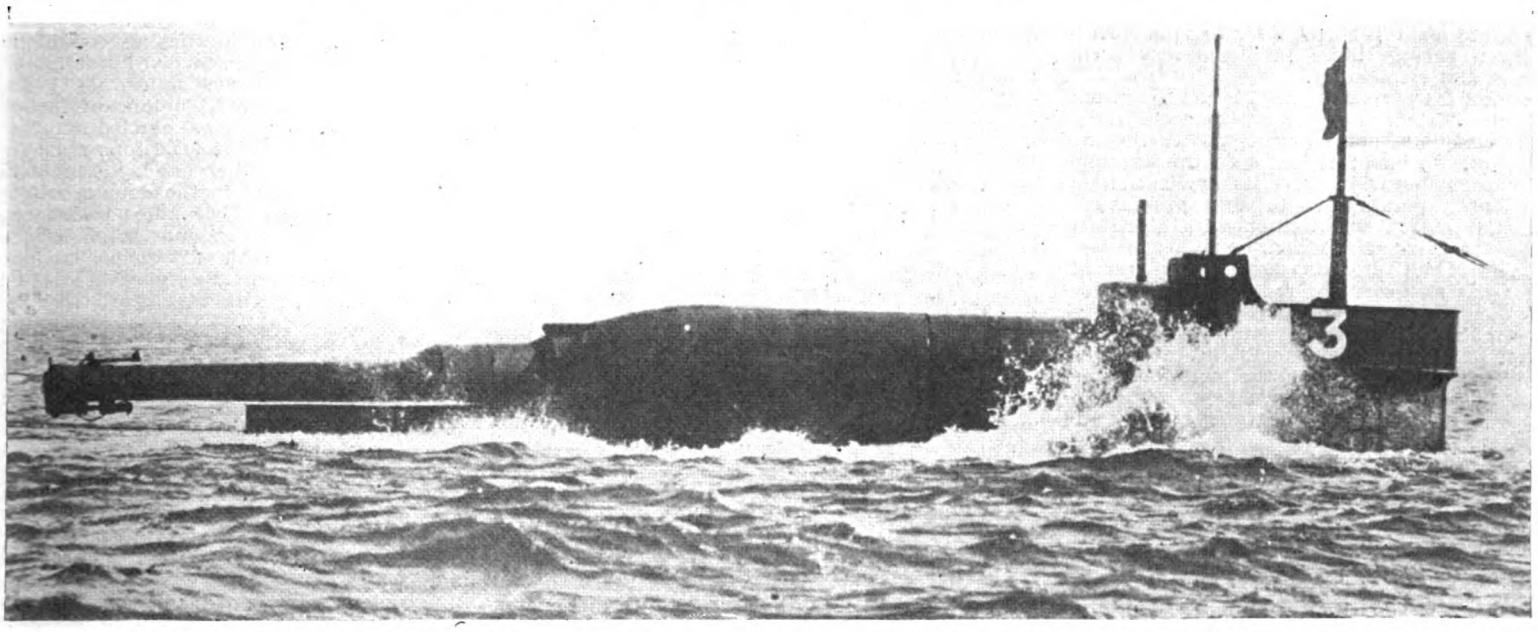


The motorship "Bayonne" owned by the Vacuum Oil Co., which has made 42 voyages between New York and the Delaware River since August 11th, last. She is propelled by a 750 h.p. McIntosh & Seymour Diesel engine.



In his estimate for 1920, the First Lord of the British Admiralty forecasts Diesel-driven semi-submersible battleships. Above is the Diesel-driven submarine M-3,—one of a number of British submersibles armed with a 12-in. gun. The M-1, a sister-craft, has previously been illustrated in "Motorship."

Our Booth was an attraction to the Public and Exhibitors alike.

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Motorships

Interesting Lecture at the Marine Exposition, New York

By DR. CHARLES EDWARD LUCKE

(Professor of Mechanical Engineering, Columbia University, and Consulting Engineer, Worthington Pump and Machinery Corporation)

WHILE steam has been the standard for 130 years, it does not imply a lack of progress; it does not mean that there has been no improvement in steam power equipment, nor does it mean that steam has been wholly without competition by other systems. Quite the contrary. There has been much improvement in the steam system itself, and even more progress considering the novelty of the matter in the competing system of developing power by internal-combustion engines for all purposes, and in development of water power with electric-transmission for stationary uses.

New developments take time, in their conception, and more time to commercially perfect them, and still more time to become fully adapted through public recognition of the advantages of the novelty. Nothing is more convincing along this line than the dates given above, indicating that after a perfected steam-engine had been put to work in the English cotton mills by Watt, it took nearly thirty years to adapt that same engine for the propulsion of a vessel, and still another thirty years to make it suitable for driving a locomotive, even though these problems now seem very simple and elementary.

In less than the period required to get the steam system well started, the present generation has seen the complete development of everything electrical that we have; it has seen the development of the steam-turbine and its application to both stationary plants and to ship propulsion, both directly and in combination with electrical apparatus. In this same period, or rather in less than the last half of this period, the present generation has also seen the reduction to practice of a totally new and competing power system, the internal-combustion method of generating power, and its application to the automobile, the motor-truck, the tractor, the airplane, the motor-boat, the submarine, and finally the motorship, to say nothing of the corresponding applications for stationary purposes.

All of these products of the internal-combustion engine and the great industries based on them, as well as the general public welfare resulting from their commercial use, are the result of a period of development beginning with a quite new conception, which period of development is less in years than it took to change a stationary steam-engine to a marine form, or to again change it to a locomotive form. No better demonstration could be found of the wonderful increase in speed with which new developments are now brought to a state of great industrial magnitude, than a comparison of the last thirty year period, comprising the whole internal-combustion engine development with the corresponding periods between Watt and Fulton, and between Fulton and Stevenson.

The automobile and motorboat are as young today as the steamship was, when Stevenson built his locomotive, and the motorship, the latest and one of the largest scale development of the internal-combustion engine, less than half as old. These new things are the more remarkable when it is considered that they have had to compete for their commercial introduction against a steam system already a century old, and in which continuous improvement had been made for its entire lifetime.

The motorship, representing the application of the internal-combustion engine to the propulsion of sea-going vessels is the latest claimant for recognition in competition with the old established steam vessel, and in spite of the fact that it is the youngest in point of development, it has already established claims for recognition that can be neither avoided nor ignored. So strong are these claims and so easily demonstrated, that there is ample justification for saying that the motorship has arrived, and the steamship has for the first time in its history a real rival that may well develop into as serious a competition with steam ships at sea as the motor vehicle in all of its various forms with reference to railroads on land. The motorship will make for itself a place in the world of shipping just as big and just as important in relation to the steamer as the motor car has done on land in relation to the steam railroad. It does mean that steam is no longer supreme.

While the motorship as a successful and economic vessel in competition with steamships is a reality, and has, therefore, passed through the first natural state of any great development, it finds itself at the beginning of the second two stages, which are: First, public recognition of its value; and second, rapid and large scale adoption.

No further demonstration of reliability or economy of the motorship in those branches of marine service to which it is adapted need be made, beyond the collection, classification and analysis of facts gathered from existing motorships now in operation, unless perhaps there may be added as further proof the list of large firms that have invested great sums of money in building or in preparation for the building of these vessels and their machinery, on the basis of their own convictions, so to be ready to meet the production demand that must inevitably follow the complete publicity of the demonstrated facts.

The fundamental element of the motorship, the element that is responsible for all of its characteristic economic qualities, is the Diesel oil-engine which is used both for propelling the vessel in large units directly, and in small units also for driving electric generators, the current from which operates all auxiliary machinery. This type of internal-combustion engine is now completing a period of twenty-five years of development for all purposes and, therefore, as such cannot be regarded as a novelty. In point of fuel consumption and efficiency, it is the most economical type of engine known.

A total of 2,700 shaft horse-power would give a cargo vessel of 10,000 dead-weight tons a speed of 11 knots. At this power and speed a motorship would burn for all purposes at sea about 13 tons of oil per day, against 35 tons for an economical oil burning steamship. The corresponding figures in port are 0.4 ton and 4.5 tons per day for the motorship and steamships respectively. Therefore, the steamer consumes more fuel-oil than the motorship at all times, eleven times as much in port and 2.6 times as much at sea.

This fuel-oil saving of the motorship over the corresponding steamship is beyond question, though the difference may vary in numerical value with type and condition of the machinery of the steamer. It represents **a yearly difference in dollars in favor of the motorship, which is larger the higher the price of oil per barrel, and the more days per year the ship remains at sea. Therefore, high fuel-oil prices make motorships more profitable than low prices compared with steamers**, and it should be noted that the trend of oil prices is definitely upward. Very long voyages also favor the motorship, and its low fuel-consumption makes it possible to carry enough for 20,000 miles in the double bottom.

The real value of a cargo ship is, however, measured by the total cost of its operation in terms of cost of carrying freight, and this total cost includes certain fixed charges and depreciation, and certain operating charges, such as engine-room crew wages, repairs and overhaul, engine-room supplies, and insurance, all in addition to the fuel-oil. While these items must all be evaluated for each case under consideration, to arrive at a definite conclusion in the relative costs of operating steam and motorships, it may be said that excepting one item, the total of the rest will be substantially the same for both ships, or somewhat in favor of the motorship. This exception is the interest and depreciation on the capital investment, which, taken at equal rates, is always against the motorship.

It is estimated that these two types of vessels would cost: **Motorship** = $1,950,000.00; **steamship** = $1,800,000.00, a difference against the motorship of $150,000.00. Charging interest and depreciation at 10 per cent, this imposes a yearly fixed charge of $15,000.00 per year against the motorship, which is neutralized when 5,000 barrels more oil are burned by the steamer than by the motorship at $3.00 per barrel, and all fuel burned in excess of this means clear gain. The steamship burns at sea 22 tons or 150 barrels more oil per day than the motorship, so that only 33 days at sea are needed to equalize difference between fuel-consumption costs and investment charges with oil at $3.00 per barrel. It is estimated that with due allowance for stays in port, an 11-knot motorship would be 133 days at sea per year between New York and Liverpool. New York to Buenos Ayres 172 days at sea per year; New York to South Africa 307 days at sea per year.

These figures show clearly that it would be easy for a motorship to neutralize its excess of yearly investment charges over the steamship by its low fuel-consumption, requiring a little more than one trip to Liverpool, less than one to Buenos Ayres, and about half a trip to South Africa, with oil at $3.00 per barrel. The time would be shorter at higher fuel prices and longer at lower prices for oil than $3.00 per barrel.

The fuel economy of the motorship makes it cheaper to operate than the steamship, in spite of greater investment charges, provided it is kept at work enough days per year for any given prevailing fuel oil prices, total yearly cost differences depending mainly, though not exclusively, on these two items of sea miles per year and fuel prices.

The lower yearly cost of motorship operation, compared with the steamship, is not the whole story, because there are some differences in cargo carrying-capacity, in addition to very great differences in engine-room working conditions, which latter are decidedly in favor of motorship.

For a trip of 13,000 miles at 11 knots, the steamer will require 2,100 tons of fuel, of which 1,100 tons only may be carried on the double-bottom bunker, so that 1,000 tons must be carried in tanks. On the other hand, the motorship with the same 1,100 tons in the double bottom cannot only complete the 13,000 miles without any extra tankage, but has still a margin of 7,000 miles reserve capacity. This difference in fuel weight means an equivalent difference in cargo tonnage, though of course with very short trips this difference becomes less. [Unless the motorship is bound for a port where oil is scarce and the balance sold as oil-cargo.—*Editor.*]

The situation as to bulk cargo is also favorable to the motorship, because in addition to the space occupied by extra fuel-oil tanks required by the steamer, the motorship machinery space is usually shorter than for a steam boiler and engine-room, and one estimate of this makes the space 58 ft. and 44 ft. long for the steam and motorships, respectively, leaving a margin of 14 ft. equivalent to 13,000 cu. ft., or 325 tons in favor of the motorship.

Complete absence of boiler rooms on the motorships, as well as elimination of steam pipes in engine-rooms, makes the whole machinery space cool and comfortable, a matter of very great importance, especially in the tropics, because under these conditions the engine-room force can work in comfort, and better care of the machinery is sure to follow as a natural result of human nature.

Motorship construction was first undertaken seriously by the Scandinavians under the conviction that the new type of machinery could be made properly reliable, and that the savings to be expected in operation over steamships was so great as to justify considerable expenditures for the necessary experimental and development works.

One of the first ship-owning firms to act on this conviction was the Royal Dutch Petroleum Company. This company ordered its first Diesel ship in 1910, and at the beginning of the war they had thirteen (13) motor-driven tankers in operation, all powered with Werkspoor engines. Their first vessel, the "Vulcanus," was the first ocean-going full-powered motorship ever built. Up to May, 1919, this vessel had covered 252,000 nautical miles and was still in satisfactory operation, notwithstanding the fact that her pioneer machinery is comparatively crude, judging by to-day's standard.

The Burmeister & Wain Company, of Copenhagen, Denmark, has built to date 54 full-powered motorships with a total d.w. tonnage of 412,170, and a total power of 150,280 i.h.p. All of these vessels are now in operation.

The East Asiatic Co., of Copenhagen, Denmark, the pioneer company in the operation of large Diesel ocean-going liners, once owned and operated 72,780 tons of steamships, but they have abandoned the use of these steam-driven vessels in their oversea trade, and are using motorships exclusively for this purpose. Counsellor-of-State H. N. Andersen (Manager-Director) cites as an example of the efficiency and reliability of this type of vessel the performance of the "Siam," one of their 10,000-ton vessels, completed in 1913. The

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"Siam" sailed from Copenhagen to Japan and back on its first voyage, then across the Atlantic around Cape Horn to San Francisco, during which second voyage the motors ran 42 days and nights without stopping. From San Francisco she returned via Vladivostok and Suez to Copenhagen. The "Siam" is therefore the first motorship to circumnavigate the globe. In doing this she covered a total distance of 62,600 sea-miles. This vessel has been in continuous operation since that time, and is still in operation and performing very satisfactorily.

From the fact that the East Asiatic Company possesses a fleet of 15 motorships totaling about 120,000 tons, and has contracted for a further 250,000 tons up to 14,000 tons each, it is evident that the Company has the greatest confidence in the motorship, and this is especially significant because of their original ownership of steamships.

The Rederiaktiebolaget Transatlantic Co. of Goteborg, Sweden, who own and operate the fine motorships "Bullaren," "Elmaren" and "Tisnaren," are so pleased with their performance that they have prepared plans for converting their best steamship, the "Bolmen," to Diesel motor power, at a cost exceeding the original investment. They have also contracted for five additional 12½-knot motorships of 9,400 tons, and one of 7,500 tons, all to be completed before 1924.

The Grangesberg Co., of Stockholm, Sweden, has in operation or building 22 motorships aggregating 176,000 tons, and 57,200 i.h.p. (Trafikaktiebolaget-Grangesberg-Oxelosund).

The Glen Line, Ltd. (Lord Pirrie's Co.), has eight ships afloat of 10,000 tons or over, with powers from 3,100 i.h.p. to 6,500 i.h.p. This company has a number of additional motorships on order, including some of 13,000 tons, and 14 knots loaded sea speed.

There are now on order with shipbuilders in Holland for Norwegian owners, 14 ships of a total tonnage of 75,600, and 35,350 i.h.p. [This has been increased to 17.—*Editor.*] There are now being built in Italy 27 merchant motorships which will be fitted with engines, ranging from 300 to 2,200 b.h.p.

Every shipbuilding nation in Europe is now building motorships. In many cases there are more motorships under construction than steamships, and some yards build motorships exclusively. The motorship is most appreciated by its owners, and most of the new construction is on repeat orders, though recruits are recorded regularly, both among shipowners and operators ordering new motorships in place of steamships, and among ship and engine builders announcing their readiness to take and execute orders.

Thus, in but little more than ten years, the motorship has emerged from the state of hope and promise to that of commercial reality, and a new phase of the industrial revolution of the internal-combustion engine has become a fact. **The supremacy of steam at sea has passed, never to return, so long as a supply of liquid fuel is available.**

The whole of this motorship development has taken place in Europe, and America has done nothing; nothing but continue to build steamships to compete with the more economical European motorships. America, the land of oil, and world leader in the production of motor cars, is only now beginning to realize that the motorship has arrived. While the American public is as yet but ill informed as to these facts, those interested most concerned, have accepted them and are acting on the conviction that motorship construction must now be undertaken by us, and that once seriously started, motor-car history will be repeated by transferring the centre of activity from Europe to America.

Large investments are now being made here in preparation for the handling of the large volume of business sure to follow public familiarity with the facts. In most cases these American firms are provided with European drawings and data, and will reproduce European practice in their construction of motorship machinery, but one of these firms, Worthington Pump & Machinery Co., has taken the step of producing main and auxiliary machinery of its own design.

The American Bureau of Shipping accepts the motorships as an insurance risk on the same basis as the steamship, and has issued similar rules for controlling safe constructions in the interest of owners and insurers. The United States Board of Steamboat Inspectors charged by law with the duty of establishing standard of competence of engineers in charge of the machinery at sea, and the issue of licenses to qualified persons is fully alive to the situation, and, having accepted the motorship as a reality, is making plans to assure owners that their engineers are safe men. Schools for training candidates for motorship engineers' licenses, are being established, and the better living conditions are attracting old steamship engineers to the new service. For proper publicity of motorship information, all marine journals are giving increasing space to the new subject, but one journal, "Motorship," devotes itself exclusively to this subject.

It would therefore seem as if the motorship was about to enter the last of the three stages of all development, following demonstration of reliability and economic value and acceptance of the facts by the special interests concerned, and that complete publicity of the situation must inaugurate a program of really large scale production and general use.

AMERICAN MERCHANT MARINE

According to statistics published in 1919, the American merchant fleet consisted of 11,525 motor craft, 7,817 steamships, and 4,474 sailing vessels.

MARINE DIESEL ENGINE DESIGNERS WANTED

Two first-class marine Diesel engine designers for medium size units are required by the Western Machinery Co., 936 No. Main St., Los Angeles, Calif. This company already has commenced construction of Diesel engines for engine-room auxiliary purposes, and are building small engines for vessel propulsion.

PACIFIC COAST SHIPBUILDER OFF TO EUROPE TO SECURE DIESEL LICENSE

Mr. George A. Armes, President of the Moore Shipbuilding Company of Oakland, Calif., is leaving for Europe, together with a staff of engineers to make a study of Diesel-engine construction in Europe, with a view to securing a license, and building these engines at their plant on the Pacific Coast. Already two steamship companies have signified their intentions of placing their order for new tonnage with the Moore Shipbuilding Company as part of their building program.

BRITISH AGENTS OF "MOTORSHIP"

Owing to the firm of James Selwyn & Co., 20 Essex Street, Strand, having been purchased by another concern they no longer represent "Motorship" in Great Britain. As soon as a new agency is established it will be announced in these columns. Meanwhile we suggest that readers in Great Britain should either subscribe direct, or order their copies from Messrs. W. H. Smith & Son, 186 Strand, London, W. C. The subscription to "Motorship" for Great Britain is $3.50 per annum.

MOTORSHIP "MALAHAT" MAKES GOOD PASSAGE

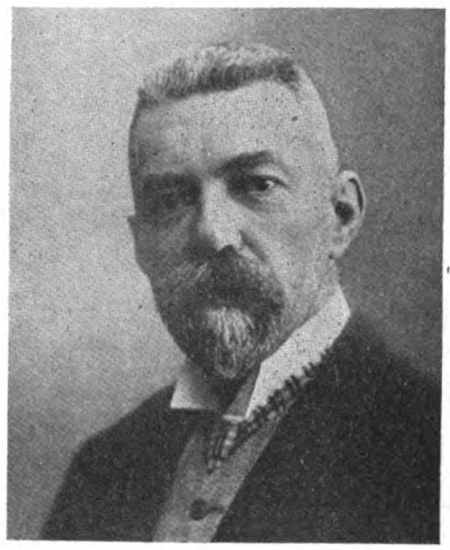
According to H. W. Lutes, Chief-Engineer of the motorship "Malahat," this vessel made an excellent trip from Honolulu to the Columbia River, Oregon, in 16 days 17 hours, and the engines ran very successfully all through the voyage. This vessel has now been cruising for over 10 months without a bearing or any serious trouble. When in Honolulu the pistons were withdrawn and everything found to be in first-class shape. The "Malahat" is propelled by Bolinder oil-engines.

A MOTORSHIP PIONEER

In the untimely death of Mr. Ivar Knudsen, which occurred the latter part of March, while on a business trip to India, motorship interests have incurred the loss of an eminent and brilliant engineer who has contributed in a very large degree to the development of the motorship. It is due to him that the name of Burmeister & Wain has made such an advance in this connection.

Born in April, 1860, he was just 59 years old at the time of his death. For the past 25 years he had been actively identified with his company, which, due to his great genius and foresight, has been elevated from a small yard of some years ago to the present prosperous and world's best-known builder of Diesel engines and motorships.

After serving a five-year engineering apprenticeship, he entered the Polytechnical College of Copenhagen, from which he was graduated. His first employment on leaving college was as civil engineer with the first electrical manufacturing company established in Copenhagen. He was here seven years, and no doubt it was this training which led him to adopt, as the first one, electrically driven auxiliary machinery for engine room and deck machinery for his motorships. In January, 1895, he entered the employ of Burmeister & Wain, and in October of the same year was appointed a sub-director of the company.



The Late Ivar Knudsen

Two years later he was made engineering-director, corresponding closely in America to the position of chief-engineer, and on January 1, 1905, he became managing technical-director, being in charge of both the engine-works and shipyard located in different parts of the city of Copenhagen. At the time of his sudden death, which was caused by ptomaine poisoning, he was the active head of the company, and for the past year had been devoting himself to the larger aspects of the business, which took him outside of Denmark.

THE STILL "DIESEL-STEAM" ENGINE

The new company formed in Great Britain with a capital of $1,500,000.00 to build the Still combination Diesel and steam marine oil-engine was overscribed, and so it was only possible to allot 40% of the applications from the general public. The Still marine engine now being built at Scotts Shipbuilding Yard at Greenock, Scotland, will be running trials in a few weeks. It has an output of 400 shaft h.p. per cylinder.

AN EXCELLENT BROCHURE

A very handsome catalogue has just been issued by Busch-Sulzer Bros. Diesel Engine Co. of St. Louis, Mo., and it is one of the most complete brochures on the subject ever issued. It is full of drawings, photographs and technical information concerning the Busch-Sulzer and Sulzer two-cycle type marine and stationary engine. In fact, it is one of the most complete publicity publications on the Diesel engine we have yet seen. One very clever illustration is a section of the Busch-Sulzer two-cycle engine.

A DIESEL ENGINE EXPERT

Readers may remember that one of the most interesting articles on marine Diesel engine operation was written by Mr. James E. Cole when he was Chief-Engineer of the motorship "Sebastian," and was published in the March, May and June, 1917, issues of "Motorship." Mr. Cole gave his experiences with ships fitted with M.A.N., Polar, Frerichs-Junkers and Werkspoor designs of Diesel engines, and supervised the erection of some of these engines in the shops. The result of the publication of his article was that the British Admiralty secured his services and installed him at Whitehall.

We have just heard from Mr. Cole that he is now the surveyor for Grayson, Barbour & Co., Consulting Engineers, Naval Architects and Ship Brokers, 18-3 Via Alla Nunziata, Genoa, Italy. This firm is desirous of securing a similar agency for Italy for ships' plates and machine tools, and are in a position to undertake the supervision of ship repairs in Italy on behalf of American shipowners.

In view of Mr. Cole's experience, it is our opinion that some American marine oil-engine manufacturer now starting in business should endeavor to induce Mr. Cole to come to the United States and become a citizen, as we can do with additional men of his type and experience in this country.

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Another Neptune Marine Oil-Engine

Swan, Hunter & Wigham Richardson Produce a 1,500 Shaft H. P. Engine With Rocking Lever Driven Air-Pumps.

LAST December we published drawings and a description of the new Neptune-Polar type of stepped-piston, two-cycle marine Diesel-engine produced by Swan, Hunter & Wigham Richardson of Newcastle-on-Tyne, England, since the war. This motor had an output of 1,500 shaft h.p. at 115 R.P.M. from six-cylinders 18 in. bore by 37 in. stroke.

It is somewhat surprising to know that this well-known shipbuilding company has now designed quite another form of two-cycle marine Diesel-engine of the same power at a similar speed. The latest design (Fig. 1 and Fig. 1a) is of the port-scavenging trunk-piston class, and in many ways is quite distinctive, especially the cast-steel columns, the form of which is quite novel to Diesel engines—at least, so far as we are aware. Also, we believe it to be one of the first two-cycle engines to have the box, or beam system of cylinder construction, which many of the leading four-cycle Diesel engine builders have adopted, the only other known to us being the old Tosi two-cycle engine.

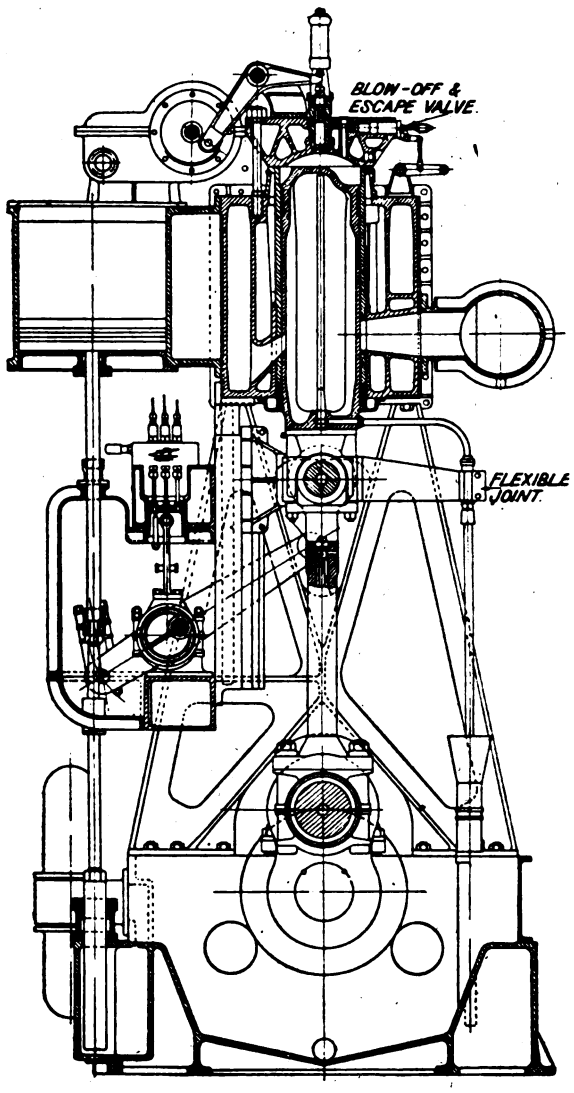


Fig. 1a. Section of the new 1,500 I.H.P. Neptune marine Diesel engine

We understand that this engine has been designed with the idea of minimum height, reduction of weight, and simplicity as the leading features. As in case of the Polar engines of the tanker "Hamlet" (Fig. 3) the scavenging-air pumps are driven by rocking-levers off the cross-heads, whereas with the engine illustrated in our December issue the scavenging-pumps were formed by a stepped extension of the underside of the working pistons, similar to the arrangement with the Polar engines of the tanker "Sebastian." It will be called to mind that Swan, Hunter & Wigham Richardson are licensees, of the Atlas Diesel Motorer of Stockholm, Sweden. The American licensees of the latter firm are McIntosh & Seymour of Auburn, N. Y., but they build a four-cycle type of Diesel engine.

One of the most important changes in design for the Neptune engine described in December (Fig. 2) is to be found in the cylinder-head, which is quite distinct from the previous dome-shaped construction, and is more on line with that recently adopted by Sulzers, except that their cylinder-head contains more webs than the Swiss design.

A rather interesting feature of the valve mechanism is that there are four cams for each cylinder, one for full-load ahead, and one for full-load astern, the other two cams being smaller, and one for slow-ahead and slow-astern running respectively, and for economizing the injection air. There are only two valves in the cylinder head, one is the injection-valve anl the other is the blow-off, or cylinder pressure relief valve.

It will be noted that the air-compressor is of the single-acting, multi-stage type, and driven from the forward end of the crankshaft. The inter-coolers are of the tube type, and are arranged in a position convenient and accessible. They are fitted with the necessary separators. The high-pressure cylinder is fitted with a loose liner, while the other compressor cylinder liners are cast with their water-jackets.

Starting and reversing of the engine is effected by admitting air to the working-cylinders through automatic valves arranged in the cylinder-heads. The starting-air is distributed to each cylinder by valves arranged in a valve-box. These valves are governed by cams, one set for the ahead direction and one for the astern direction, arranged on the camshaft. Reversing is carried out by imparting an axial movement to the camshaft. The setting of the eccentric for the scavenging piston-valve and the cams for operating the fuel-valves and the valves for operating the starting-valves are thus set for the required direction of rotation in a single operation.

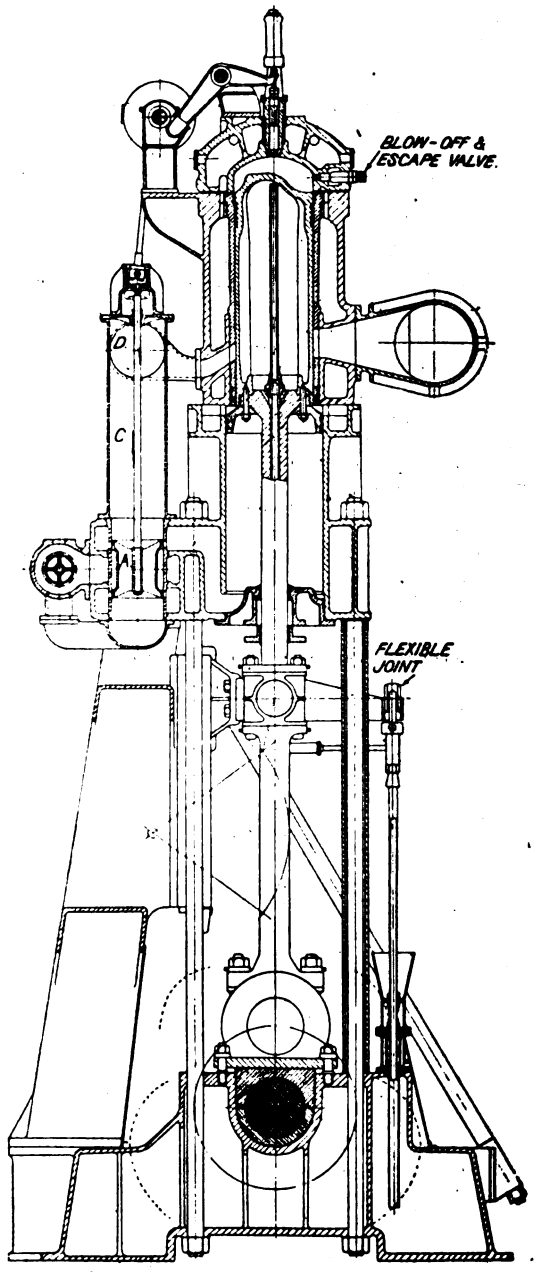
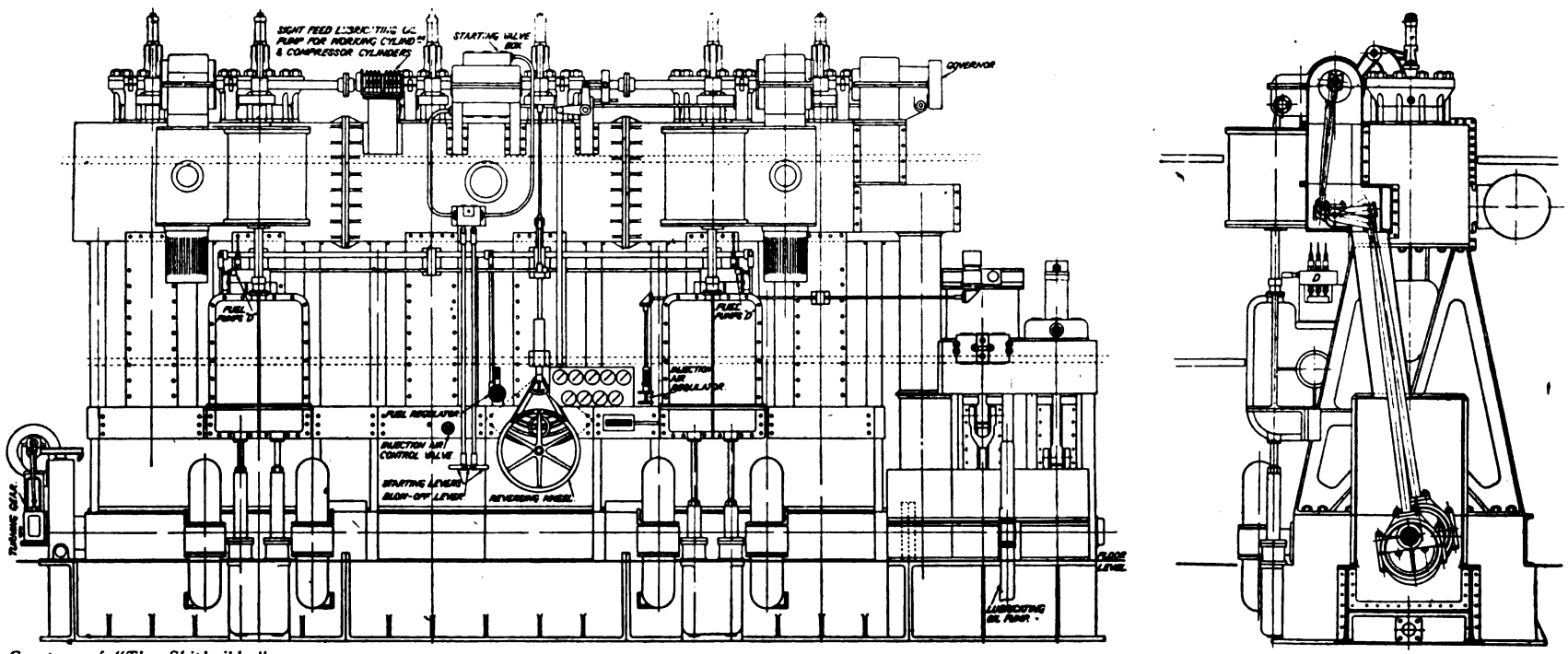


Fig. 2. Section of the stepped piston type Neptune-Polar 1,500 shaft H.P. Diesel engine



Courtesy of "The Shipbuilder"

Fig. 1. General arrangement of the new 1,500 Neptune marine Diesel engine

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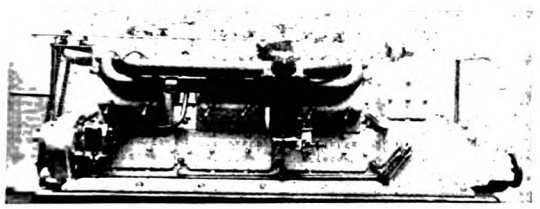
Post-War Small Marine Engine Development

Remarks Concerning Some Motors Exhibited at The British Motor Boat Show

By BASIL H. JOY, M.I.Mech.E. M.I.A.E.

READERS of this journal will not be interested in a detailed description of the Motor Boat Show, which has just closed in London, but I feel sure that they will all be anxious to know all about any novelties which may have been produced in the six years during which there has been so little chance of finding out what was being done. There is one engine which to my mind is worthy of very special notice and that is the Bolnes, a Dutch surface-ignition engine which is on quite new lines for an engine of that type. Crank-case compression has so far as I am aware always been used on this class of engine, and it has generally been considered to be the weak spot, largely because of the difficulty of maintaining absolute airtightness round the shaft; the Bolnes engine is the first to eliminate this feature.



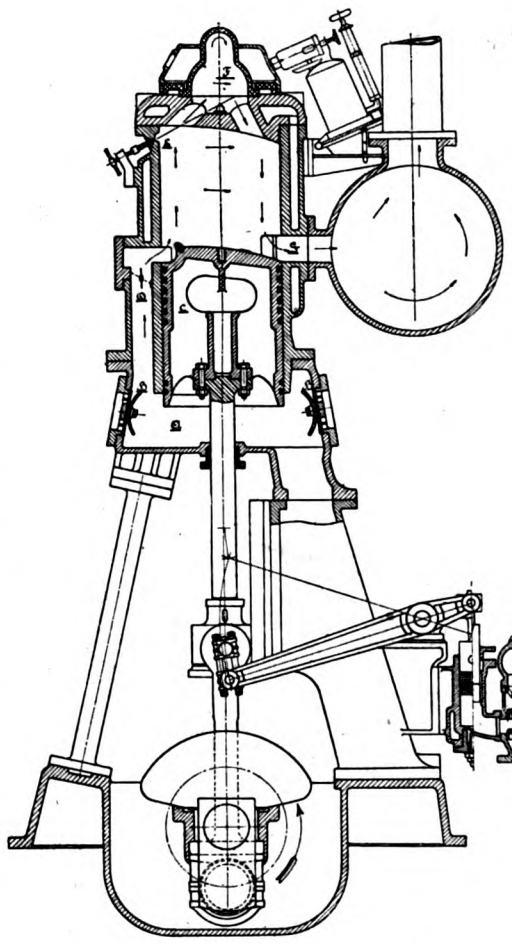
The Gleniffer Marine Engine

The sketch shows that this is effected by doing away with the trunk-piston, fitting a piston-rod, crosshead and guide, and closing in the bottom of the cylinder to form with the back column the necessary compression-chamber. An open engine thus results, so that sight feed, drip lubrication can be employed for each part. It is very curious why such an obvious solution has not been thought of before, and it may quite likely be that the freedom from what disadvantages there are with crank-case compression has been too dearly purchased as the Bolnes engine must be more expensive to build, and it is certainly higher, though probably no heavier, than the usual type with the enclosed crank case. [The Bolnes engine is on very similar lines to the American-built Sumner surface-ignition engine, of which sixteen 350 b.h.p. and four 600 b.h.p. units are already installed in 10 motorships.—*Editor.*]

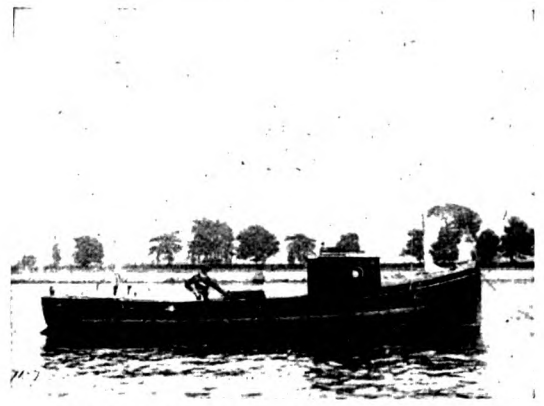
It will, however, undoubtedly appeal to many on the ground of its similarity to ordinary steam-engine practice, and the abolition of the gudgeon-pin hidden away in a hot and inaccessible place, though the accessibility of the piston is no better than on the ordinary design. Steam engine practice is further followed by driving the pumps, both fuel and water, off an air-pump lever. The fuel-nozzle is simply a very small hole without any spraying device, and pulverization is obtained by directing the jet of fuel on to a knob in the hot-bulb, though I should hardly have thought that this would do all that is necessary in order to give the most economical combustion. The engine is made in sizes from a single cylinder of 10 B.H.P. to a six cylinder of 600 B.H.P., the latter running at 175 r.p.m., having cylinders 470 m.m. bore by 550 m.m. stroke, being 10 ft. high, 30 ft. long and weighing 825 cwt.

Another quite novel engine was shown by the British Commercial Lorry and Engineering Company of Manchester, which is a clever combination of the two systems, the Duplex valveless and the sleeve valve. Two cylinders are placed in pairs alongside each other with both connecting rods on a single pin, one rod being articulated to the other. Each piston is surrounded by a sleeve on the Knight sleeve-valve Engine principle operated by an eccentric, one sleeve controlling the inlet port at the top of one cylinder, the other sleeve controlling the exhaust port at the top of the other cylinder, the two cylinders having a common combustion chamber. It will be realized that the original Duplex system is followed only so far as the two athwartship cylinders are concerned with a view to permitting a single sleeve to be mounted on one piston instead of the more delicate arrangement of the two sleeves for inlet and exhaust on the Knight Engine, while the straight through scavenge of the Duplex is not required as the present engine works on the four-cycle system. Rather remarkable claims are made for this engine on the score of horse-power and its development will be worth watching.

I have not been able to follow recent American practice in marine motors of the smaller and higher speed type, but from the comparatively few engines to be seen at the Show coming from America, it would appear that development in the United States and Great Britain seems to be running on very similar lines. I have always been an advocate for the greatest possible accessibility on marine engines, for the enclosing of all small parts, such as valve springs and electrical gear, and for good inspection doors to the crank case. A great majority of the engines shown indicate that careful consideration has been given



Section of the Bolnes Oil-engine



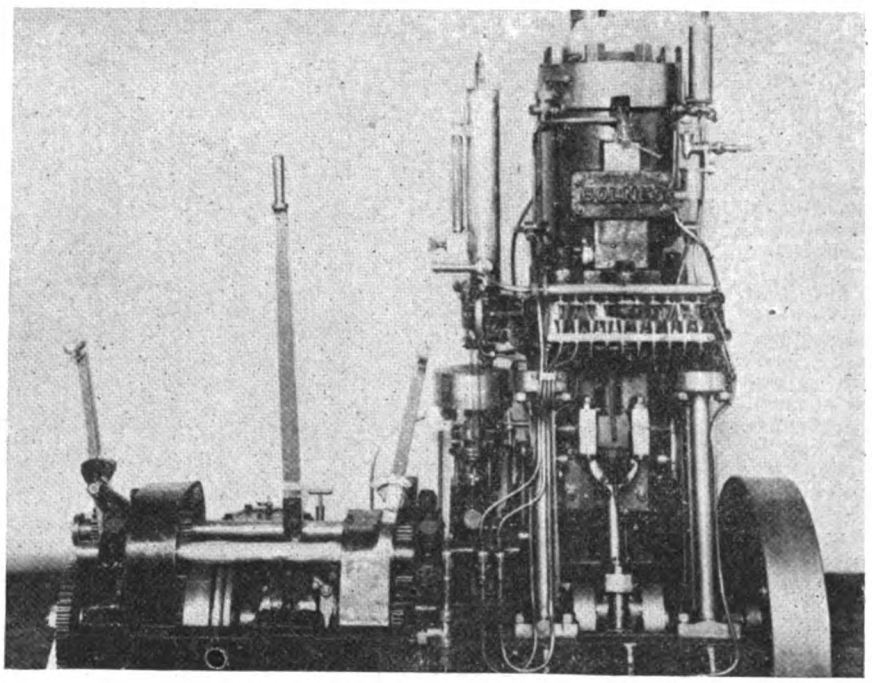
A Ship's Motor Lifeboat by Thornycroft

to these points, and illustrations of what I think are two of the nicest British made engines are attached to show the general arrangement that is being adopted in Great Britain.

The Gleniffer six-cylinder engine made in Glasgow is a comparatively heavy and slow running type, and embodies a very ingenious form of splash lubrication. The flywheel is enclosed and throws the oil up into a receiver in its casing from which it flows by gravity through four pipes to each of the main bearings; from the bearings it runs into wells under each connecting rod and so finds its way aft again. For this type of engine I feel convinced that forced lubrication is unnecessary, and that the pump is a possible source of trouble which it is better to be without.

The 28 H.P. six-cylinder engine made by J. W. Brooke & Co. of Lowestoft is a lighter and higher speed type, but has the same general characteristics of the accessible crank case doors and enclosed valve springs, but with forced lubrication to meet the conditions of the higher revolution speed. The water and oil pumps are, however, carried out right to the forward end of the engine and are very accessible. The carburetor is at the back of the engine with internal cast passages to lead the mixture to the inlet valves, resulting in an absolutely clear front, which is very pleasing to look upon.

Both these engines avoid a fault which is by no means absent in a number of engines where good crank-case doors are fitted in the front alone and then a magneto, carburetor, or other accessory is apparently deliberately dumped down in such a position as to prevent all access to the doors without first removing the aforesaid accessory. Such a piece of design appears to me to indicate either want of thought, or want of knowledge on the part of the designer. I do think that in almost no engineering production is actual experience, both in running and repairing, more necessary than in the marine motor.



The Bolnes Marine Oil-engine

OVESUNDS WORKS TO BUILD 10,300 TONS MOTORSHIP

It has been announced that the Svenska Ost Asiatic Kompaniet (Swedish East Asiatic Co.) has ordered a Diesel-driven motorship of 10,400 tons d.wc. from the Ovesunds Works.

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Framing of Diesel-Type Marine Engines

PART II.

A Discussion of the Various Designs

By "DRAWING BOARD"

(*Continued from page 223, March issue*)

In a two-cycle single-acting engine there is no upward load on the bearing-caps or bolts, but it is as well to allow the same, as in a four-cycle engine, as in case of a loss of compression they would be subject to the full upward inertia-load of the moving parts, and it is this load occurring during the exhaust-stroke that gives the basis for calculation in a four-cycle engine. The cap must be treated as a beam, preferably supported at the bolts and loaded in the center, with the load as calculated. The bolts securing the cap are in tension under half this load and the stress is thus readily obtained.

In this type of engine the cylinder-jacket becomes virtually part of the framing serving as it does to transmit the side-thrust from the piston to the framing, while it also transmits the loads due to the pressure in the cylinder. The side load, if excessive, greatly decreases the life of the cylinder-liner, and therefore should not exceed a pressure of from 30 to 40 lbs. per square-inch, while the tensile stresses due to cylinder pressures, are at all times undesirable. The side load can be obtained by scaling-off the pressures on the indicator-diagram, represented by the force "P" in Figure 3. This is resolved by the triangle of forces into a side-thrust "R" and a connecting-rod load "W." The side-thrust "S" divided by the net area of the piston gives the side-load on the liner. The net area is of

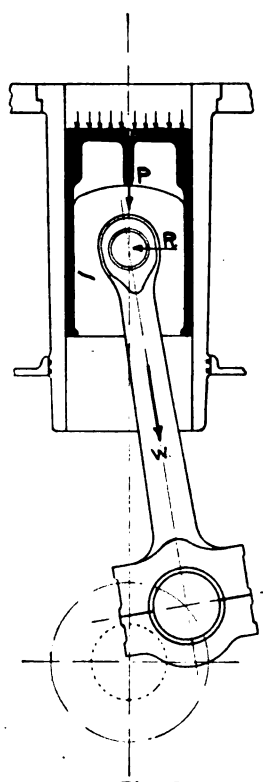

Fig. 3

course the dia. multiplied by the length bearing on the liner. with all oil-grooves, etc., allowed for.

The problem of tensile-stresses in the cylinder and framing has been dealt with in various ways, the most satifactory method being that of fitting throughbolts. Long steel bars are firmly bolted through the transverse bearing-girders, and passing up through the framing to the cylinder-head, serve to bolt cylinder-head, jacket, and framing firmly to the bed-plate. By this means the loads due to the cylinder pressures are transmitted direct to the bed-plate by means of these through bolts. As the framing and cylinder-jacket are thus relieved of all tensile-stresses, they can be made much lighter and simpler while the B M's on the transverse bearing frames are reduced.

High-Speed Marine Engines—There are one or two types of framing for high-speed Diesel-engines which do not conform to the standard design already considered, and of these, three are indicated in Fig. 4. At "A" is shown the Vickers framing. In this design each main-bearing is carried in a separate cast-steel transverse girder "A" which are recessed into longitudinal wrought-steel beams "B" of section shown. Fitted bolts ensuring a rigid job. The columns "C" are made

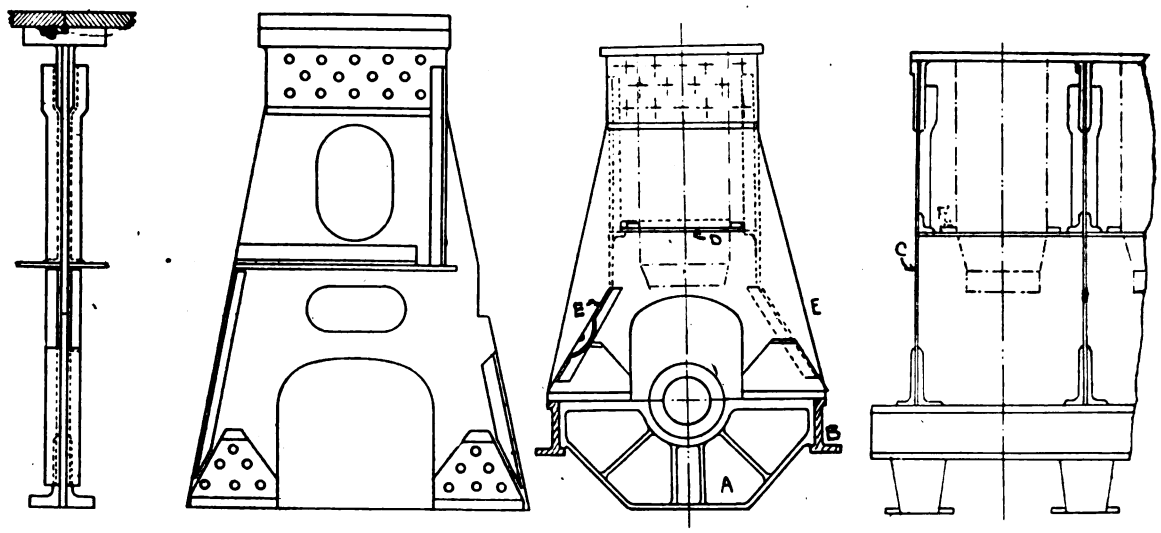

Fig. 4

of plate of good quality, the heads and feet being forgings, cold riveted to the plate, the holes being reamered, and the rivets entered from either side alternately to prevent distortion. The column is stiffened by light angles which also support the tie-plate "O," and the crank-case covers "E," which are fitted with hand-hole doors to enable the operator to feel the main-bearings and the connecting-rod bottom-end. The cylinder-jacket, which is supported from the column head, does not fit tightly into the tie-plate, but is held firmly by four snug-plates "F" which are held by fitted bolts to the tie-plates.

The example shown at "B" is the Sabathé type, and is shown chiefly to illustrate the method adopted for easy dismantling, and the accessibility of the crank-case, one side of the crank-case being completely detachable, so that even the crank-shaft can be removed without dismantling the whole engine. It should also be noted that the cylinder-jacket in this case is cast integral with the crank-case. The example shown at "C" is the Craig type, and in this engine the cylinder-jacket is bolted unto the entablature "A," which is supported on the hollow wrought-steel columns "B." Steel bolts "C" pass through these columns from below the transverse-girders to the top of the entablature. The crank-case is rendered tight by plates bolted to the entablature and bed-plate. It should be noted that the cylinder-jacket is not relieved of tension loads as the through-bolts do not pass to the cylinder-head in this design.

Slow-Speed Marine Engines—Three designs of framing for slow-speed cross-head type Diesel-engines are shown in Figure 5, the design shown

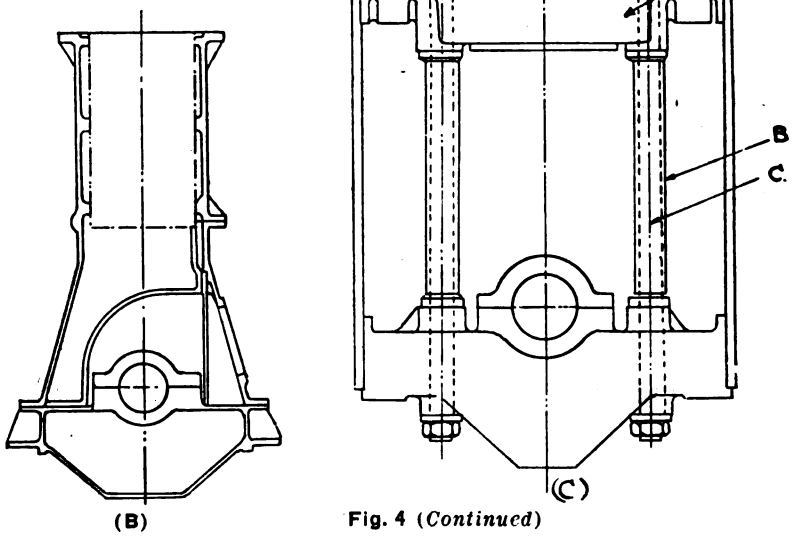

Fig. 4 (*Continued*)

at "A" having bed-plate cast-columns, and an entablature, while the design shown at "B" has a bed-plate and forged-steel columns. In this type of engine the bed-plate is of different and heavier section than those previously dealt with, and the various designs in practice follow closely on the lines of those shown in Figure 5a. The longitudinal girder is of a box-section having raised facings for supporting the columns. It is the practice with some makers to cast an extension on the end of the bed-plate to carry the thrust-bearing, but this is not usually done. To cheapen the manufacture of these bed-plates it is usual in multi-cylinder designs to cast the bed-plate in two or more pieces, effecting a deciding saving in pattern-making expenses thereby and at the same time reducing the risk of faulty castings to a very large extent.

The joints in the bed-plate must obviously be good rigid jobs, to insure the correct alignment of the shaft, and for this reason they should occur at the point of minimum stress. Considering the portion of the bed-plate for each cylinder as a beam supported at the center of the main-bearings, and loaded on the center line of the cylinder, the bending moment will be a maximum on the cylinder center, decreasing to nothing at the supports, i. e., the center of the bearing, and therefore there is no direct stress on this section, so that any joint in the bed-plate should occur at the center of the bearing. In a design where two bearings are fitted between any adjacent cylinders, the joint can be made equally as well between these two bearings. Fitted bolts are provided to ensure a rigid joint. A sketch of a joint in the bed-plate is shown in Figure 6.

When a compressor or scavenge pump is driven direct off the crank-shaft, the bed-plate is made of similar section as for the main engine but of smaller dimensions.

The columns of slow-speed engines provide opportunity for different designs, in that either

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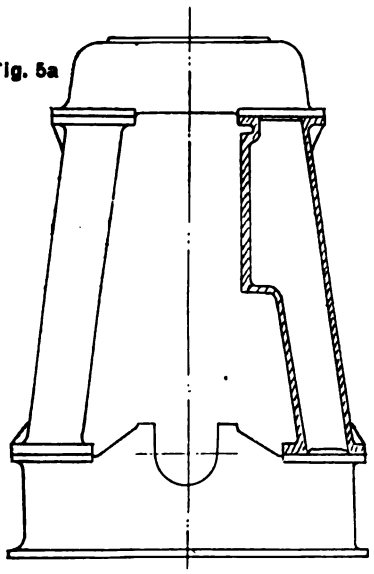
Fig. 5a



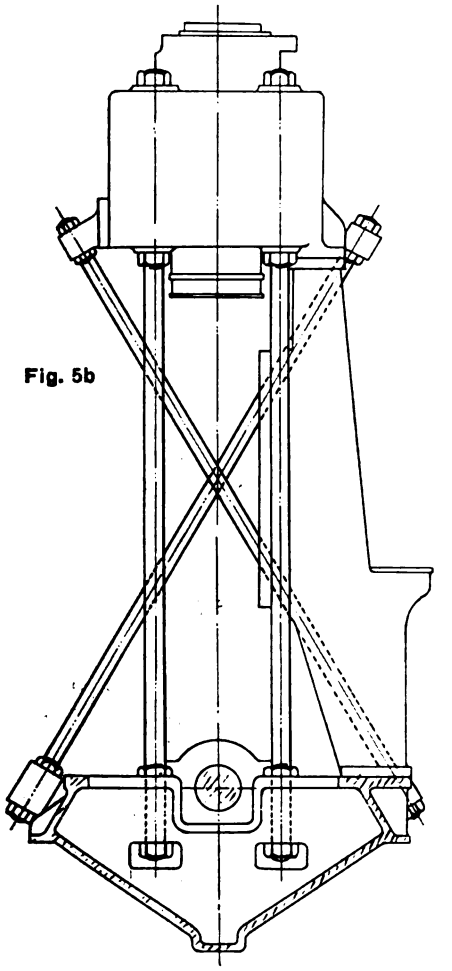


Fig. 5b

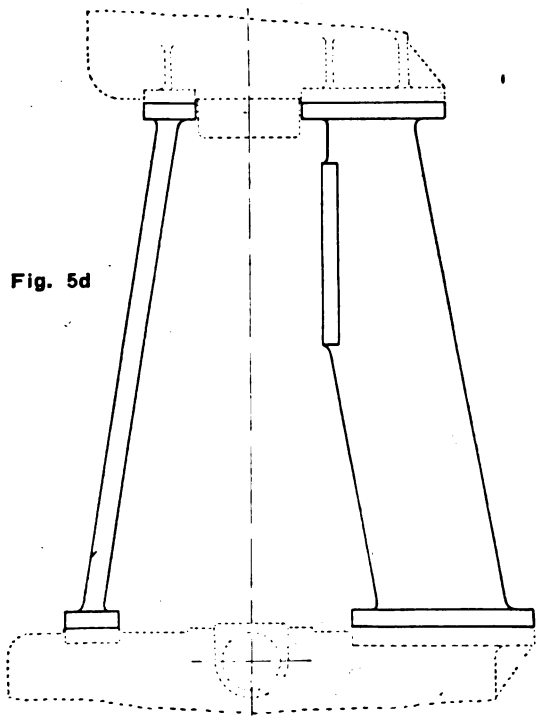
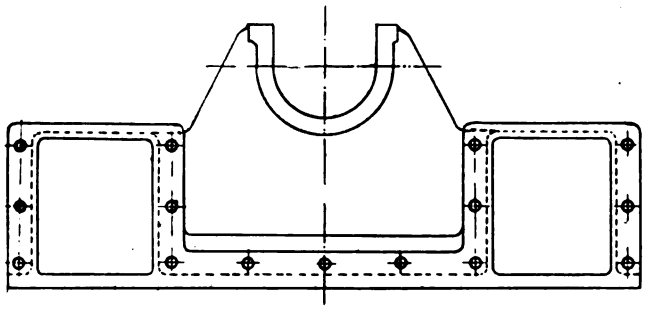
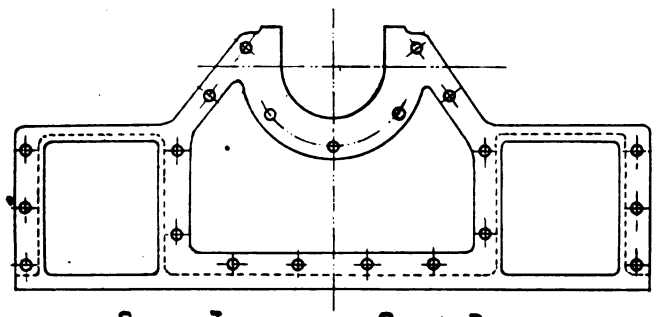


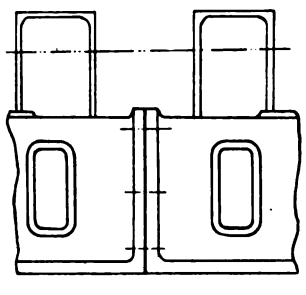
Fig. 5d



SHEWING JOINT BETWEEN BEARINGS



SHEWING JOINT THROUGH CENTRE BEARING.



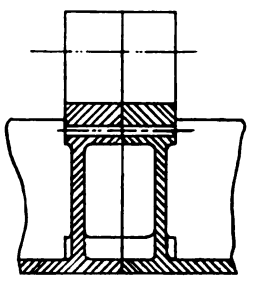


Fig. 6

cast or forged columns can be used or a combination of both types may be employed. In Figure 5, "A" shows a design in which cast columns are employed both front and back, and at "B" a design having forged-steel rods as columns. It will be well for us here to consider the nature of the loads acting on these columns. Figure 7 shows the loads on the column guide-face due to cylinder-pressures and the angularity of the connecting-rod. The cylinder-pressure, for various points of the stroke as shown at "X," and the resultant side-thrust can be obtained, and also the point at which it occurs. Taking this maximum load, the bending moment and the consequent stress in the column is readily obtained. At the same time allowance should be made for the direct tensile-stress in the column due to the cylinder-pressure having to pass through them.

It is generally agreed that the cast-column is the more suitable design when the side-thrust alone is being considered, as a good broad face is obtainable direct on the column, allowing the bearing-pressure on the guides to be kept low, but when considering the tension loads, the decision is in favor of the forged-steel columns. For these reasons then, various compromises are effected by various makers, such as the fitting of through-bolts to take the tension stresses, while retaining the cast columns to take the side-thrust, such as until recently incorporated in Sulzer engines, or, as in the Holland Werkspoor design the cylinder is supported on forged-steel columns stiffened by diagonal stays, while a cast-iron column is provided on one side to take the side-thrust, the attachment of this column being so arranged that it takes none of the tensile loads whatever. The American Skandia-Werkspoor Fig. 5c differs, as there are cast columns and forged circular columns on both sides. The Worthington

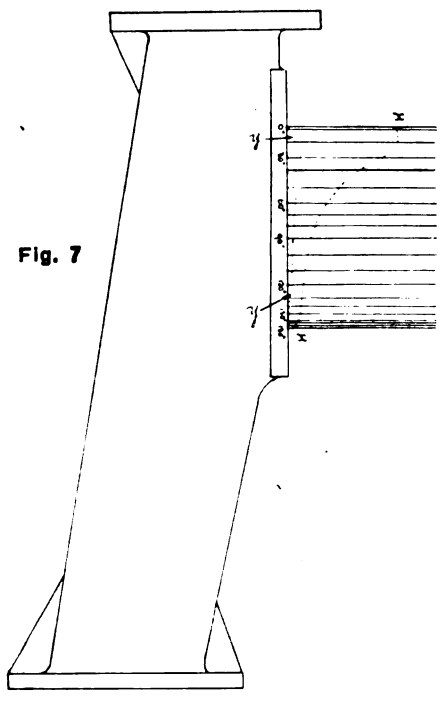


Fig. 7

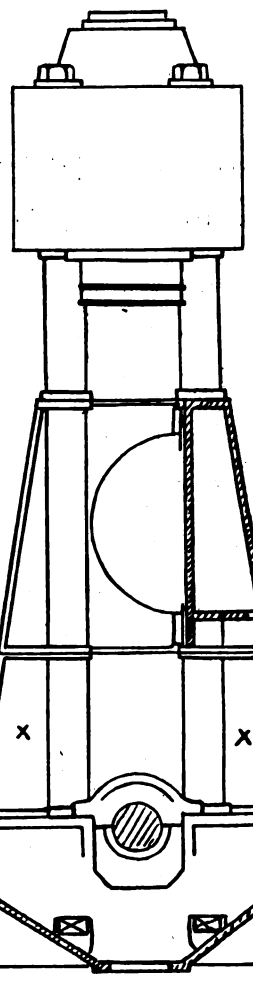


Fig. 5c

marine engine also follows this practice and, as with the Skandia engine, the lower part of the cast-iron column slides-out, allowing the crank-shaft to be rolled out.

While again in some designs the practice is adopted of fitting cast-columns on one side of the engine and forged-steel columns on the other, as shown in Fig. 5b, the cast-columns being provided with facings to take both the ahead and astern side-thrusts. Taking the general arrangement of the engine into account, the cast columns have a decided advantage in that they provide suitable supports for various brackets, pumps, or compressors, while in some engines the hollow columns provide receivers for intercoolers or the scavenge-air, but the possible presence of sand may make this practice doubtful. It is the practice in some designs to tie the columns together to ensure a rigid engine for any lateral vibration; this can be done by either of the methods shown in Figure 8. The design shown at "A" consists of columns having a projection cast on either side terminating in a flange which bolts to a similar flange on the next column, while the design shown at "B" has the ordinary type column surmounted

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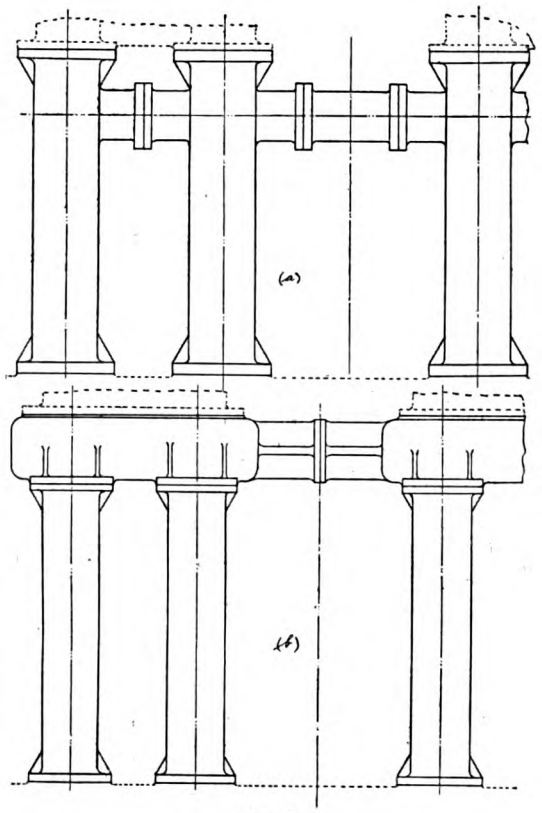


Fig. 8

by an entablature, which as mentioned is a heavy casting between the column head and the cylinders, and running the whole length of the engine, in one or more pieces. These constructions are also useful, in that the load due to any one cylinder is not carried by the columns of that cylinder alone, but it is distributed over the adjacent columns also.

The framing of the engines of the "Monte Penedo" is shown in Fig. 9, and gives an excellent illustration of the practice of fitting through-bolts. The construction of the bed-plate is also novel inasmuch as the bottom of the bed-plate is left open, to make an easier casting. This hole is covered over by a light cover to complete the oil-well. However, these through-bolts have been discarded in the latest designs of Sulzer merchant-marine Diesel-engines, the cast-iron columns carrying all the load and stresses.

MR. WINTER JOINS FAIRBANKS CO.

Mr. A. S. Winter, formerly connected as Advertising and Sales Manager for The Wm. Powell Co., has joined the sales force of the Fairbanks Company, Pittsburgh, Pa., and will represent them in Southern Ohio.

RUSSIAN DIESEL-ENGINE WORKS IN OPERATION

Three Kolomna Diesel-engines of 250 shaft h.p. are being constructed at the Kolomna Works, Golutwin, near Moscow, Russia, for three 750-ton motorships building for the Reval Steamship Co. of Reval, at the Peter-Werft Shipyard, Reval. The engines are of the four-cycle type, and have four cylinders 12.99 in. dia. by 14.96 in. stroke and turn at 300 R.P.M.

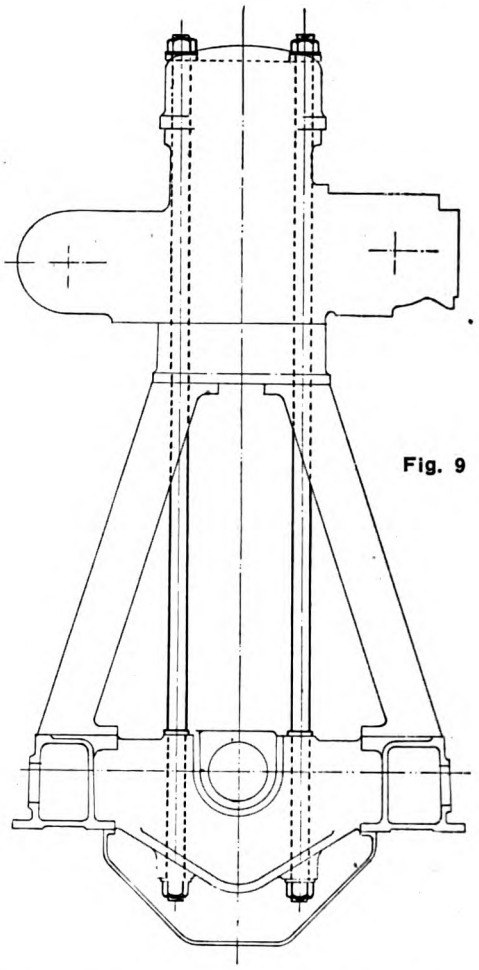


Fig. 9

Danish Opposed-Piston Diesel Engine

The Kalundborg 240 B.H.P. Marine Heavy-Oil Motor

IN view of three American firms having experimented with the small opposed-piston type of Diesel engines, two of which are for marine work, and because the American rights and patents of the Junkers engine were purchased some months ago by an American firm, details of a new Danish marine motor of this class constructed in Denmark for standardized vessels of 500 tons will be of considerable interest. We are enabled to publish the following details by arrangement with a British contemporary. These engines are for vessels now under construction at the Norwegian Ancas Shipyard, Arendal, and the motors are being built at the Kalundborg Motorfabrik, of Kalunborg. Incidentally it may be remarked that this company also builds a type of motor working on a modified Diesel principle, starting being on gasolene with electric ignition. We have no details of this engine, but it is said to have operated satisfactorily.

The opposed-piston engine, of which a four-cylinder 240 b.h.p. model and a three-cylinder 180 h.p. set have cylinder dimensions of 200 mm. (7.87") bore and a piston stroke (each piston) of 300 mm. (11.81") the speed of revolution being 250 per minute.

In general design the engine is of the ordinary Junkers type with the two pistons operating in one cylinder, the top piston-head being connected by means of long connecting-rods which are driven by the crankshaft on each side of the main connecting-rod attached to the bottom piston. The whole is enclosed in an outer casing, so that the appearance given is that of an entirely-enclosed motor.

This engine is of the two-cycle type, compression occurring on the inward stroke of both pistons, the fuel being admitted when they are approximately at their inner dead centers. Combustion takes place followed by expansion with the pistons drawing apart. The scavenging air is admitted at the bottom of the cylinder above the bottom piston when it uncovers the port. This air sweeps through the cylinder to the top and makes its exit through exhaust ports just below the bottom of the top piston at its highest point. Then the cycle is renewed. The scavenging-air inlet and exhaust ports are uncovered by the piston when at the bottom of its stroke.

With this arrangement there is a minimum of valves in the combustion space. The fuel valve is centrally located and operated horizontally. There are two other valves in each cylinder. One is the air valve for the admission of starting and manœuvring air and the other is the relief valve.

All these valves are horizontal and are operated by means of vertical levers pivoted at their centre on a spindle running the length of the engine. They are operated from cams on a horizontal camshaft located at about the top of the crankchamber. This camshaft is driven through gearing from the crankshaft in the usual manner.

The reversing and manœuvring of this engine is by compressed air. There are two cams side by side for the operation of each valve, and in order to set these cams for astern running the handle is pulled back to the dotted position. This brings all the astern cams, which are on the left of the crankshaft, beneath the rollers of the valve levers for the three valves in each cylinder.

The fuel-oil pumps which are grouped at the forward end of the engine in front of the air compressor, also have their plungers actuated by means of cams on the camshaft, one fuel pump being provided for each cylinder. The engine is not directly connected to the propeller shaft, but drives through a clutch. A governor is fixed at the forward end of the engine driven through gearing from the camshaft.

The arrangement of scavenging pump and injection air compressor is unusual. It will be noticed that these are located at the forward end and are combined, a two-stage air compressor being arranged above a double-acting scavenging pump, all driven from one crank on an extension of the crankshaft effecting a well-balanced arrangement. Forced lubrication is used throughout, and for the provision of the lubricating oil a small oil-pump is fitted at the forward end of the engine, the oil passing through an oil filter, which is seen in the illustration.

The fuel-consumption for the four-cylinder 240 h.p. motor is 0.465 lb. per b.h.p. hour, whilst, for a 60 h.p. single-cylinder engine it is 0.475 lb. per b.h.p. hour. The weight of the 240 h.p. set is 13 tons, whilst the single-cylinder engine of 60 h.p. weighs 3½ tons.

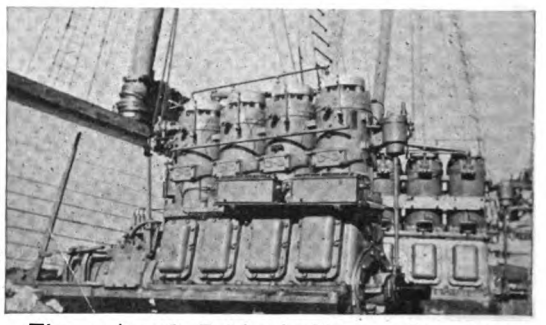
On the 500-ton wooden ships in which these engines are installed, three winches are fitted, all driven by one 10 h.p. surface-ignition heavy-oil engine. The winches lift 750 kilos (about 15 cwt.) at a speed of 90 ft. per minute, or 1,500 kilos (about 30 cwt.) at 45 ft. per minute.

NEW DUTCH 900 TONS STEEL AUXILIARY SCHOONER

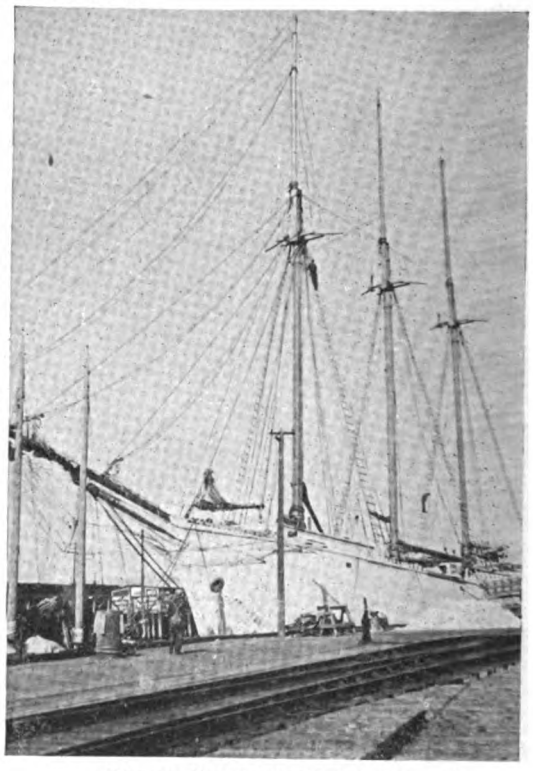
A four-masted steel schooner of 900 tons d.w.c. has been launched by Wortelboer & Co., Westerbroek, Holland, in which an 180 I.H.P. Kromhout surface-ignition oil-engine is being installed as auxiliary power. On deck a Deutz kerosene motor will operate the winches, etc.

NEWFOUNDLAND AUXILIARY "SAMUEL COURTNEY"

Among the wooden motor-auxiliary schooners built in Newfoundland during the latter part of the war was a little vessel named "Samuel Courtney" built by Mr. O'Brien of Noel, N. S., and owned by Geo. M. Barr, of St. Johns, Newfoundland. This vessel is propelled by two 100 b.h.p. Fairbanks-Morse heavy-oil engines, and started on her maiden voyage to Greece on January 9th, 1919. The vessel has a length of 171 ft. by 35 ft. breadth, a gross tonnage of 531 tons, and is of 441 net tons.



The pair of Fairbanks-Morse oil-engines alongside the "Samuel Courtney"



The auxiliary "Samuel Courtney"

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Small Oil-Engined Commercial Craft in China

Splendid Business Opportunities for American Manufacturers

During the past half-dozen years Chinese engineers have made a study of the marine heavy-oil engine in moderate powers. Because of the unskilled labor to be found all over China, and because of the lack of originality on the part of the average native, the simplicity of the surface-ignition type of marine-engine has strongly appealed to the Chinese engine-builder with the result that there are now a number of builders constructing this type of oil-engine, while many craft are fitted with motors that have been imported. We give on this page a number of illustrations of some interesting motor craft now in service in Chinese waters and for some of the illustrations we desire to express our thanks to the American Consular service at Swatow, China, who advise American oil and kerosene engine builders to get into touch with boat and shipbuilders, or oil-engine importers, at Hong Kong, where most Chinese motorcraft are constructed.

Consul Raymond C. Mackay, of Hankow, in a recent Commerce report states that China with its myriad water-ways, stands as a wonderful untouched market for engines of this type. The water-ways have been used whenever possible to the exclusion of all other means of transportation.

Referring to the copying of Bolinder oil-engines by Chinese companies in Canton, he states that these motors can be put on the market at about one-third of the cost of an engine made in the United States or Europe. This is due to the cylinders and pistons being constructed from No. 3 Black India pig-iron, which is so soft that the cylinder-walls can be scratched with a common wire-nail. There is no uniformity in cylinder dimensions due to unscientific methods of boring. Also the pistons fit poorly, the ring-grooves are not square and the rings are not surfaced to properly fit the grooves. The engines made in Canton, China, none of which is more than 5 years old, give constant trouble, do not develop the power for which they were guaranteed and require an extravagant amount of fuel and lubrication.

Consequently, some of the manufacturing plants which are contemplating an extension want foreign-made crude-oil engines. But no catalogues of this type of engine are on file at the Canton Consulate, and these would be most valuable. Nevertheless, the habit of inquiring at the consulate for oil-engine catalogues is becoming rather common. The catalogues serve as splendid introductions to prospective purchasers of American engines. Therefore "Motorship" urges American oil-engine firms to send their catalogues to Consul Mackay.

Messrs. Banker & Co., Ltd., of Hong Kong and Kongmoon, recently installed two 180 H.P. American Pacific Coast-built Diesel-engines in one of their passenger boats. The Kwang Nam Dockyard of Canton recently installed two 180 H.P. Japanese built oil-engines in their first 3,000 tons coastwise freighter, but the engines gave so much trouble that steam-machinery was used in subsequent vessels.

It is interesting to note that the Chinese Admiralty is contemplating the use of twin 240 H. P. Nelseco Diesel-engines built by the New London Ship & Engine Co. of Groton, Conn., which were taken out of the German ship "Tsingtao."

During 1919 a number of steam tug-boats were converted to surface-ignition type oil-engine power. Altogether there are about 300 tugs operated on regular schedules by Chinese firms in Canton, and 100 of these have recently been called out of service because of the prohibitive price of coal, while further orders for crude-oil engines have been placed with a native company. For these tugs an engine of 120 H.P. is needed. There are more than 100 motor-launches from 20 to 40-feet long owned in China, and the majority of these are equipped with American motors, 15 different makes being in use.

It is rather interesting that floating restaurants, known as "flower-boats," are being modernized and equipped with slow-speed marine oil-engines and electric-lighting units. American engines have been installed in all these boats.

Consul-General George E. Anderson, of Hong Kong, states that the crude-oil engine of a simple heavy type best suits the requirements of the Chinese on practically all lines.

For further information regarding the method of handling the Chinese marine oil-engine business, we suggest that our readers refer to the U. S. Commerce Report No. 3 issued at Washington, D. C., on Monday, February 9th, 1920.

Among the vessels illustrated is the "Sue Cheong," a passenger vessel fitted with a four-cylinder, two-cycle 100 b.h.p., Bolinders oil-engine, turning at 400 R.P.M. Crude-oil is used as fuel, consumption of which is said to be 0.45 pounds per horse-power per hour. This vessel is 90 feet long by 16 feet breadth and 5 feet draft. In addition to passenger accommodation on the upper deck, she has considerable space for cargo on the main deck and in the hold. She was placed in service in 1917 by W. G. Humphreys & Co., a British firm, who also placed the motor vessel "Sue Tye" on the Swatow-Kityang, 32 miles run, the previous year. The latter has a 120 h.p. Bolinder engine.

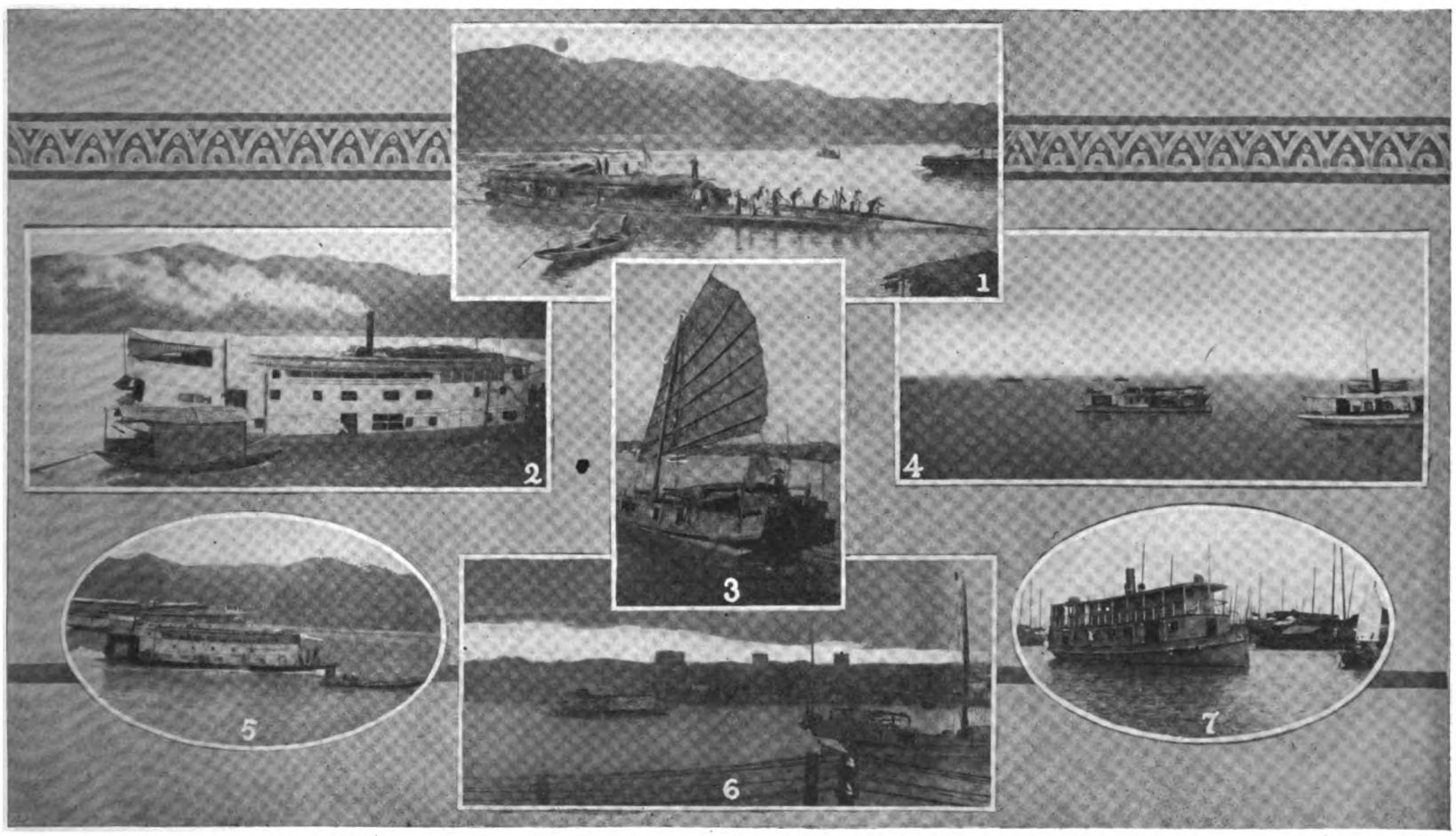
Another Bolinder-engined vessel is the "Sue Yue," a [illegible] fitted with a motor of 45 horse-power at 475 R.P.M. Her breadth is 14 feet and her draft 14 inches.

The quaint looking craft illustrated by figure 1 is a typical Chinese cargo-boat as used in the interior of Southern and South Western provinces, and unlike vessels in the Western hemisphere, is steered from the bow by means of the big oar shown. The craft illustrated is shown just arriving at Wuchaw, in the Kwangsi Province, 350 miles up the Kiu Kiang.

The vessel with the smoky exhaust shown in figure 2 is a Chinese motor passenger-boat propelled by an 80 b.h.p. two-cylinder Hip Tung Wah surface-ignition heavy-oil engine. It is rather interesting to note that ordinary passengers may ride any[illegible] observation-deck at the stern, which is reserved for first class passengers. A reader of "Motorship" not long ago traveled four days on this craft from Lotinghau in the Province of Kwang Tung to the Province of Kwangsi.

Another quaint Chinese craft is illustrated by figure 3. These may be termed a "Chinese Auxiliary." Her power consists of about two coolies operating a tread-mill connected by rods-and-cranks set on the quarter. The man-power has been transmitted to the shaft of the stern paddle-wheel, which may be seen moving very slowly. She also carries auxiliary sails. The foreigners in Canton call this craft a "Rice Boiler."

Another passenger boat is depicted in figure 5, and this craft was built at Wuchon in the Kwangsi province. She is a twin-screw boat propelled by two 40 horse-power kerosene engines copied from the Gardner four-cycle type motor, the original of which is built in England. These imitation Gardner engines are built at Wuchon in a small steam-engine shop by a few enterprising Chinese.



(1) Typical Chinese cargo-boat as used in interior of southern and southwestern provinces. She is steered from the bow by a big oar. (2) Chinese motor passenger ship propelled by an 80 H.P. Hip Tung Wah oil engine. (3) Chinese auxiliary stern-wheeler. Power for the paddle under the stern is furnished by two coolies operating a tread-mill. (4) "Sue Yue," propelled by a 45 H.P. Bolinder oil-engine. (5) A passenger boat at Wachow fitted with a copy of the Gardner kerosene engine. (6) The vessel in the distance is a Chinese shallow draft boat propelled by two 100 H.P. Hip Tung Wah surface-ignition oil-engines. (7) "Sue Cheong," a 90-footer equipped with a 100 H.P. Bolinder oil-engine.

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Interesting News and Notes from Everywhere

LAUNCHING OF THE MOTORSHIP "ATHENE"

The 6,600 tons d.w.c. motorship "Athene" was launched at the Rijkee shipyard "Rotterdam" on Feb. 4 last. She has Werkspoor Diesel-engines installed.

PISTON SPEED OF 1,140 FT. PER MIN.

When bringing home an injured member of the crew during the war, the solid-injecion oil-engines of a Brtish submarine were run for 14 hours at a piston speed of 1,140 ft. per minute.

MOTORSHIP OWNERS' EARNINGS

In 1919 the earnings of the Transatlantic Steamship of Gothenburg were 36,500,000 kroner. The total tonnage of the company in motorships and steamships is 173,000 tons d.w.

NEW 1,500 SHAFT H. P. INGERSOLL-RAND SOLID-INJECTION MARINE OIL-ENGINE

Designs for a 6-cylinder 1,500 shaft H.P. marine heavy-oil engine are now being prepared by the Ingersoll-Rand Company and the engine will use the Price solid-injection fuel system. The engineer in charge of the designing work is Mr. H. Schreck, who will be well known to our readers as having compiled and edited our "Patent Section" for the last two years.

ORIENT COMPANY ORDERS ANOTHER MOTORSHIP

In our issue of March, 1920, on page 208 we announced that the Rederiaktiebolaget Orient of Stockholm, Sweden, had ordered three sets of Diesel engines of which two pairs were for 8,000 ton motorships. We now learn that they have ordered a single-screw motorship of 4,900 tons d.w.c. from Palmers Shipbuilding Company, of Jarrow, England, in which a Sulzer two-cycle type Diesel engine will be installed.

NEW INTERNATIONAL CHAMBER OF COMMERCE

It has been announced by the Chamber of Commerce of the United States that the new International Chamber of Commerce will be formally organized at Paris, during the week ending June 21st next. About 100 American delegates of business and industrial associations are expected to attend. Permanent international headquarters will be created. The members of the Organizing Committee are as follows:

UNITED STATES

A. C. Bedford, Chairman of the Board of the Standard Oil Company.
Thomas W. Lamont, of J. P. Morgan & Company, New York City.
Edward A. Filene, President, William Filene's Sons Co., Boston.
Richard S. Hawes, President of the American Bankers' Association, St. Louis.
John H. Fahey, of Boston, formerly President of the Chamber of Commerce of the United States.
S. C. Mead, Secretary of the Merchants' Association of New York, Vice Chairman and Secretary.

FRANCE

Eugene Schneider, Chairman, Head of Creusot Steel Works and Harfleur Marine Diesel Engine Works, etc.; President, British Iron and Steel Institute; former Member of Chamber of Deputies, Paris.
Tirman, Councilor of State, Paris.
Roche, Delegate of General Syndicate of Chemical Products, and Administrator Delegate of the firm of Poulenc Brothers, Paris.

BELGIUM

Louis Canon-Legrand, Chairman, President, Chamber of Commerce, Mons, Belgium.
Prof. Paul Van den Ven, University of Louvain.
Alexander De Groote, Vice-President, Antwerp Chamber of Commerce.

Two additional members of this committee will be named by the Central Committee of Industry of Belgium.

GREAT BRITAIN

Lord Desborough, Chairman, President, British Imperial Council of Commerce, London.
Sir Arthur Shirley Benn, K.B.E.; M.P., Managing Director, Hunter, Benn and Company, London.
Edward Manville, President, Association of British Chambers of Commerce, Coventry.
Stanley Machin, President, London Chamber of Commerce, London.

One member of the committee will be named to represent the banking interests of Great Britain.
R. B. Dunwoody, Secretary, Association of British Chambers of Commerce, London.

ITALY

Comm. Ferdinando Quartieri, Chairman, President of the Italian Corporation for Chemical Industries, Milan.
Comm. Prof. Vittorio Meneghelli, President, Chamber of Commerce of Venice.
Comm. Giorgio Mylius, President of the Italian Master Cotton Spinners' and Weavers' Association, Milan.
Comm. Pietro Giovanni Lazzerini, Lazzerini Brothers, Shipping, Carrara, Italy.
Comm. Augusto Jaccarino, Banco di Napoli, Rome.

The new International Chamber of Commerce is the outcome of the International Trade Conference, held at Atlantic City, N. J., last October.

MOTORSHIP BUILDERS PROFIT

Burmeister & Wain, the motorship builders of Copenhagen, Denmark, have made a profit for the year 1919 of 5,250,000 kroners and have declared a dividend of 15% after setting aside various large sums. They do not build steamships.

BETHLEHEM STEEL COMPANY TO BUILD CAMMELL-LAIRD FULLAGAR ENGINES

Report has reached us that the Bethlehem Steel Company is taking-out a constructional-license for the Cammell-Laird Fullagar opposed-piston type marine Diesel engine. Details of this engine were given in our last issue.

SKANDIA-WERKSPOOR ENGINE COMMENCES 30 DAYS NON-STOP RUN

On April 8th the first 850 shaft h.p. American-built Werkspoor Diesel engine for the U. S. Shipping Board started on the 30 days' non-stop test run. We understand that there was an extensive gathering of shipping men and engineers present at various days during the run.

BOUND VOLUME OF 1919 ISSUE OF MOTORSHIP

We had a number of bound volumes of "Motorship" made up for the year 1919, some with and some without advertisements. Most of these volumes already have been sold, but we have a few left without the advertising section which can be obtained from this office at $8.00 each, postage extra. Weight of the volume without advertising is 5½ lbs. The special Schneider supplement is included.

Government motor-boat from which the gauging and sounding of the Mississippi River's five mouths is done every day, to keep a record of the amount of silt and mud deposited and to guide the dredges in their work

LARGE STEEL MOTORSHIPS AT $140.00 PER D. W. TON

The Bruusgaard Kiosterdud Steamship Co., Ltd., have taken over a contract from the Rosenberg Mek. Verksted, of Stavanger, for the building of a 9,000 tons d.w.c. twin-screw motorship that is to have two 2,700 I.H.P. Sulzer-Diesel engines installed, and which will be delivered in 15 months' time. The contract price of the ship is 775 Kroners per d.w. ton (about $140.00). As this ship will carry about 8,400 tons of actual cargo, without counting fuel, water, and stores, this price figures at about $150.00 per net-cargo-ton, or about $50 to $60 per net-cargo-ton less than any American steamship of similar tonnage could be built for to-day.

BRITISH OIL EXPERTS READ PAPER AT PITTSBURGH

Shortly before going to press we learn that a paper on the "Theory and Practice of Lubrication" is due to be read at the National Petroleum Association's Meeting, William Penn Hotel, Pittsburgh, Pa., by Mr. Henry M. Wells, and James E. Southcombe of London, England. The great synopsis of the paper is as follows:

"The functions of a lubricant. The problem of 'Oiliness'. Previous attempts to explain the superior 'Oiliness' of Fatty Oils as compared with Mineral Oils with reference to various physical properties. Experiments on Surface-tension. Different capillary behaviors of Fatty Oils and Mineral Oils shown to depend on free Fatty Acid content of the former. Manufacture of compound lubricating-oils without using Fatty Glycerides.

"Practical applications in improving the efficiency of Mineral Oil and the manufacture of emulsifying and non-emulsifying Oils. Results in Actual Practice. Effect on World shortage of Fats and Oils."

DUTHIE MAY BUILD TWO MOTORSHIPS

We understand that orders for two 1,000 tons d.w. motorships may be placed with J. F. Duthie & Co., of Seattle, by West Coast interests.

A 5,000 TON WOODEN TANKER

The 5,000 tons d.w.c. wooden-built, steel-lined motor tank-barge for the National Oil Co., of New York, has been named "J. F. Penrose." She was briefly described on page 20 of our January, 1920, issue. Her launch took place recently at Orange. A 1,000 i.h.p. McIntosh & Seymour Diesel engine will turn the single screw.

SIXTEEN VICKERS MERCHANT-TYPE DIESEL ENGINES ON ORDER

We have been advised by Messrs. Vickers, Ltd., of Barrow-in-Furness, that they have received orders for a total of 16 merchant type Diesel-engines of 1,250 shaft h.p. each, at 118 R.P.M. We understand that four of these engines are for two twin-screw ships for the Anglo-American Oil Company, as already stated in these columns.

Altogether they have 25 solid-injection type Diesel engines on order, aggregating 40,000 horsepower. Vickers out-put in Marine heavy-oil engines for the year 1919 was 22,000 h.p., in addition to 11,350 h.p. stationary gas-engines.

13 KNOTS ON 7 TONS OF FUEL PER DAY

The fourth of the steel motorships building for Winge & Co., of Christiania, Norway, by the Netherlands Shipbuilding Co., of Amsterdam, will be of an unusual type, as although of but 3,800 tons d.w.c. she will be fitted with a six-cylinder Werkspoor Diesel engine of 2,140 I.H.P. at 110 R.P.M. Her speed will be 13 knots, which is considerably higher than the average cargo-ship of this size. As she will only use 7 tons of fuel-oil per day at sea, she is a commercial practicability, whereas an oil-fired, or coal burning steamer of this size and power would not be an economical proposition.

The other three motorships building at this yard for the same owners are of 6,500 tons d.w.c. each.

THREE MOTORSHIPS EARN EIGHTEEN-MILLION KRONERS FOR NORWEGIAN GOVERNMENT

S. O. Stray & Co. Buy Three Diesel-Driven Vessels for $240.00 Per Ton

Although the Norwegian Government recently decided to retain control of motorships, they have just sold the single-screw, 5,000 tons d.wc. motorships "Folkvard," "Lidvard" and "Landvard" to S. O. Stray & Co., of Christiania for the sum of 18,000,000 kroners, or $240.00 per ton at current exchange rates. These vessels are converted steamers and were sold to the Norwegian Government several years ago for 7,657,000 kroner. Including the money earned by these Diesel-driven vessels, they have brought a profit of about 18-million kroners. The cash will be set aside for the construction of new motorships when the Norwegian shipyards are not so overwhelmed with orders.

MOTORSHIP ARRIVES AT GREAT COAL PORT SHORT OF OIL, BUT SAVES $3,500.00 IN FUEL

Recently the 6,500 tons d.w. Australian motorship "Kangaroo" arrived at Cardiff, the great Welsh coal-port short of oil-fuel. No worse place to load her bunkers could be imagined. But, says "Shipbuilding & Shipping Record," she only uses 5 tons of oil-fuel per day, and she took aboard 100 tons of oil at £11 per ton. It is estimated that if a steamer, the coal consumption of the "Kangaroo" would be about 25 tons per day, and thus for a ten days' passage she would need 250 tons, which at £5 per ton would cost £1,250, while for the same journey her consumption of oil would be only 50 tons, involving £550. The saving in oil as compared with coal for a 10 days' trip thus amounts to £700 in the cost of bunkers alone, which does not take into consideration the fact that a smaller space is required to store oil bunkers than for coal, thus adding to the available cargo space and the cargo carrying capacity of the vessel.

It is reported that the Anglo-American Oil Company have decided to erect works at the Newport, Mon., docks on the town side of the River Usk on a large tract of land between the South Quay and the river.

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DENMAN URGES MOTORSHIPS

Mr. Wm. Denman, former Chairman of the U. S. Shipping Board, recently called upon Admiral Benson, the present Chairman, and urged an extensive use of Diesel engines in the ships of American merchant-marine. We are glad to say that he found Admiral Benson in a receptive attitude.

ANTARCTIC SHIP "TERRA NOVA" TO HAVE OIL-ENGINE

In the Antarctic exploration ship "Terra Nova," owned by the British Imperial Antarctic Expedition, a 480 shaft h.p. Beardmore heavy-oil engine of special design is to be installed. It may be remembered that various "Polar" exploration ships have had oil-engines installed, including Ammundsen's "Fram."

STRONG NORWEGIAN MOTORSHIP COMBINE

The Christiania shipowning-firms of Otto Thorensen and Thor Thorensen have consolidated and now have a total capital of 24,000,000 kroner. The new company, known as Otto Thorensen and Thorensen Aktieselskabet, have a fleet of 85,000 tons under construction in England and Holland, the majority of which are cargo-ships and will be Diesel-driven.

NEW OIL BUNKERING COMPANY

Coal, oil and steamship interests have combined in England in the formation of a new fuel-oil supply company known as the Oil Bunkering Company with a capital of $6,000,000.00. Prominently connected with this new organization are Sir Frederick Black and Sir Charles Greenway, of the Anglo-Persian Oil Company, Lord Inchcape, of the P. & O., and F. J. Leathers, of the William Cory Coal Company.

NEW ENGINEERING PUBLICATION

A very interesting little magazine, known as "The Tech Engineering News," has been issued by the Massachusetts Institute of Technology of Cambridge, Mass., under the editorship of Mr. Hazen Pratt. It is a fine little publication, and we desire to compliment the editor and students on its production. The price is 10 cents per copy. So far as we know, this is the first attempt that has been made by any publication of this type to secure the attention of both students and engineers and to interest them in each other.

"STORFOND," A 9,500 TON MOTORSHIP

The motorship "Storfond" now building for the Storfond Aktien Dampskibssekaskab of Stavanger, Norway, at the yard of J. & K. Smit, Kinderdyk, Holland, has the following dimensions:

Dead-weight-capacity	9,500 tons
Power	4,280 I.H.P.
Length	439 ft. 8 in.
Breadth	57 ft. 1 in.
Depth	28 ft. 7 in.
Draught	27 ft. 0 in.
Speed (loaded)	12½ to 13 knots

The Diesel engines are being built by Werkspoor of Amsterdam.

AN INTERESTING EXPERIMENT

Last year a well-known Scottish firm of shipbuilders installed two distinctively different types of heavy-oil engines in a small vessel for experimenting purposes. In each case the engine was of 120 shaft h.p. One was a Still combine internal-combustion and steam engine, while the other was a Sulzer two-cycle type Diesel engine.

Owing to the builders considering that the experiment is on a little too small a scale to justify conclusions which they arrived at as being applied to larger engines and their types of craft, they have decided to withhold the results for the time being.

SUBMARINE BOAT CORPORATION MAY BUILD TWENTY 9,000 TON MOTORSHIPS

It has been previously reported in these columns that two high-powered Diesel-engines are being built for the Submarine Boat Corporation (of New York, N. Y., and Newark, N. J.), by the James Craig Engineering Works of Jersey City, N. J., and by the New London Ship & Engine Co. of Groton, Conn. These engines will be istalled in a fabricated freighter of 9,000 tons d. w. and of 12 knots speed. It is the intention of the Submarine Boat Corporation to lay down and sell to private interests 20 of these vessels. While they are figuring on both Diesel and steam engines, it is probable that Diesel oil-engines will be installed in all or most of these craft. The designs of the ships are by Mr. Theodore Ferris, and it is said that several of these motorships are tentatively ordered, and that some of them will have the Diesel-electric propulsion system.

MARINE AND COMMERCE CORPORATION OWN EIGHT MOTORSHIPS

No fewer than eight wooden motor-auxiliary sailing-ships of large tonnage are owned by the Marine & Commerce Corporation of America, 25 Beaver Street, New York. They are as follows:

City of Beaumont, City of Pascagoula, City of Galveston, City of Orleans, Snia Austin, Miramare, Mantova, Modena.

This is a large Italo-American concern, and the President is Mr. Riccardo Gualino.

FIRST LORD OF ADMIRALTY FORECASTS MOTOR BATTLESHIPS

In his explanatory statement on the British Naval Estimates for 1920, the First Lord of the Admiralty said: "Although the battleship remains, its type may require to be altered. Advances in electricity, in the internal-combustion oil-engine, and in science generally will inevitably necessitate an eventual change of type. It is even possible that the present battleship will change to one of a semi-submersible type."

ENGINEERS FOR MOTORSHIPS

In a recent issue we published some names of engineers experienced in motorship operation who had registered their names with us. To this list we would add the name of Douglas B. Green, Machinist, U. S. Navy, c/o Inspector of Machinery, Bethlehem Shipbuilding Co., Fore River Plant, Quincy, Mass.

This man, while in the Navy at present, would like to secure a position on board a motorship. He holds license as engineer of motorships of any tonnage and is First-Assistant of steamships of any tonnage. He has had about five years' experience with Diesel-engines in U. S. Submarines both at sea and in the shops.

We have added to our present list of motorship operating engineers the name of James G. Lutes, 2981 Montana St., Oakland, Cal.

Mr. Lutes holds an unlimited tonnage license able experience with construction, testing and (U. S.), and advises us that he has had considerable experience operating Diesel engines.

MAINTENANCE SERVICE

For the nominal annual subscription of 6 Pounds (about $25) users of Plenty marine heavy-oil engines have the right to call upon the service of a qualified engineer from the engine-builders' works four times each year to check over all adjustments and settings in order to insure satisfactory and economical running until the next visit, or to carry out any repairs and replacements that the owner may not care to entrust to the regular crew. This subscription covers the man's time only, traveling expenses being charged in addition.

DIESEL ENGINES FAVORED BY SWEDISH SHIPBUILDERS

(From the U. S. Commerce Report, April 7, 1920)

It is of interest to note that 70 per cent of all ships now building in Sweden will be equipped with Diesel-motors. The opinion in Sweden is that the oil-engine is decidedly superior to the combined oil and coal burners and this opinion is supported by the testimony of the large Swedish shipping companies that have used the Diesel motorships for many years. As the Diesel-engine ship seems to become the prevailing type in the Swedish mercantile marine, several of the largest shipyards have changed their equipment in order to be prepared to build the new type exclusively. The largest ship-yard in the country, Götaverken A/B at Göteborg, has enlarged and altered its docks and workshops with a view to using the new type, and other large yards are expected to follow this example.

A company with a capital of 8,000,000 crowns [1 Swedish crown, at par=26.8 cents] has been formed in Sweden, which will erect fuel-oil bunkering stations at several Swedish ports. The corporation was formed by the largest shipping companies and by Emissionsinstitutet and Svenska Finansinstitutet, the last named being large banking concerns. It is planned to supply fuel-oil to ships and to factories which will use oil for fuel in place of coal. Arrangements have been made with large oil companies in the United States to furnish oil for an extended period of time. The stockholders in the new concern include the following important Swedish shipowners: Dan Brostrom, G. Carlsson, H. Metcalfe, and E. Brodin.

MANY NEW MOTORSHIPS RECENTLY DELIVERED.

In recent issues of "Motorship" reference has been made to a large number of new full-powered and coast-wise oil-engined motorships that have been placed in service, mostly in Scandinavian countries. We now follow with another list, all of which vessels have been registered at Lloyds.

* * * *

The 500 tons, gross steel motorship "Bure" has just been built for the A/S Ganger Rolf, Shipowners, Christiana, Norway, by the A/S Nes Mek. Verkstads of Tonsberg. A Polar two-cycle type Diesel engine furnishes her propelling power.

* * * *

A 110 tons wooden full-powered motorship has been launched by I. Digen of Sogn, Norway, to his own order. A Norsk oil-engine has been fitted.

* * * *

A. D. Story & Co. of Essex, Mass., have recently completed the 130 tons, gross, wooden auxiliary "Herbert Parker" for Mr. B. A. Smith of Gloucester, Mass. Two Fairbanks-Morse oil-engines are installed.

* * * *

The new motor-schooner No. 108 of 550 tons d. w.c. has recently been launched at the J. Th. Wilmink & Co yard in Groningen, and the dimensions are: Length, 125 ft.; breadth, 26 ft.; breadth, 12 ft. This vessel is propelled by a Kromhout oil-motor.

* * * *

"Nomis," a new 460 tons gross wooden auxiliary schooner built by the Pensacola Vessel Construction Corp. of Pensacola, Fla., to their own order (Segari Export & Import Co., Managers) has been powered with twin four-cylinder 8½ by 10 in. Fairbanks-Morse surface-ignition oil-engines.

* * * *

"Polarstjernen VII" is the name of a 339 tons gross wooden motor-vessel that the Rederiaktiebolaget Polstjernan, of Stockholm, Sweden, has recently taken delivery of. She has lately been completed by the A/S Skibs Lilles, of Korsov.

* * * *

A Standaard heavy-oil engine, built by Steyaard & J. Waelen, of Rotterdam, Holland, has been fitted in the 314 tons gross steel ship "Rap," owned by the N. V. Scheepvaart, Mij. Rap of Hoogez'nd. The hull was constructed by Gebr. G. & H. Bodewes, of Martenshoek.

* * * *

Mr. G. Huizink of the N. V. Commercialle, My. tot Explotatie van Vaartingen, of Amsterdam, Holland, has named their new steel 408 tons gross motorship—the "Obbekarspel." The craft is powered with a Kromhout oil-engine and was built by Gebr. G. & H. Bodewes of Martenshoek. The sister motorship has been named "Weesperkarspel,' and is propelled by a Standaard heavy-oil engine.

* * * *

Among new orders of oil-engined ships in Scandinavia is a steel motorship of 3,850 tons d.w. c. placed with the Helsingborg Varv, of Helsingborg, by the Rederi, A. B. Tertia of Goteborg, Sweden.

* * * *

The launch has been made of a 650 tons d. w. c. steel motorship recently completed by the A. B. Motorbots Werft., Stockholm. Trials have been run of the 920 tons d. w. c., 700 h. p. Polar-engined steel Diesel tanker "Skif" built at the Finnboda yard for Nobel Bros. Trials also have been run of the steel Diesel motorship "Cimbria," built by the I. C. Petersen's Mek. V. of Tvelleborg, and of the 240 h. p. wooden motor-coaster "Dalasker" built by the Dalasker Werf.

* * * *

Trials have been run of the auxiliary-schooner "Gerda" built for the Det Baltiske Rederi for their Iceland trade. A Tuxham oil-engine is installed. The Bornholms Motor & Steamship Co. have taken delivery of their 600-tons auxiliary motor-schooner "Mogenskoch," which vessel was referred to in a recent issue of "Motorship."

* * * *

Three more coastwise motorships have been launched in Norway. One, the "Rognlund," is of 500 tons d.w.c. and is of wooden construction. She was built by the Brevik S. V. Shipbuilding Company. The second vessel is the "Ancas 1," a 600 ton wooden ship built by the Ancas Shipbuilding Company, while the third vessel, the "Solangen," is a steel ship of 500 tons and was constructed at the plant of the Harstad Mek Verks of Skiensfjorden.

An interesting little train ferry has been built of steel by the A/S Rodby Havns Skibsvaerft of Rodby, Denmark, for service between Gaalense and Masuedsund. The vessel is 80 ft. long by 70 ft. breadth and is propelled by a two-cylinder Tuxham surface-ignition oil-engine of 100 b.h.p.

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Our Readers' Opinions

[The Publication of Letters does not imply Editorial Endorsement of Opinions Expressed—EDITOR.]

MOTORSHIP'S VALUE TO SHIPOWNERS

To the Editor of "Motorship,"
Sir:

We are all agreed that there is not a more excellent paper in your field than "Motorship," and we have found it most profitable and instructive reading.

Yours very truly,
KERR STEAMSHIP CO., INC.,
Ralph McBrayne,
Director of Advertising.

17 Battery Place,
New York City, N. Y.

LIBRARY OF CONGRESS DESIRES BACK COPY OF MOTORSHIP

To the Editor of "Motorship."
Sir:

I have the honor to acknowledge your letter of Feb. 20th stating that you are unable to furnish all the copies of your publication desired by the Library of Congress to complete its file.

May I, however, venture this suggestion, that a brief notice in the columns of your periodical, calling attention to the Library's needs, might be of great assistance in collecting odd numbers now out of print.

If you are willing to extend this aid, it may secure to the Library the complete file which we are sure it will be your desire, as it is ours, to have deposited in the National Library. The copy of "Motorship" which the Library needs is No. 9, Vol. 4, which is the Sept., 1919, issue.

Yours very truly,
Herbert Putnam,
Librarian of Congress.

Washington, D. C.

[We wonder if one of our readers could oblige the Librarian of Congress with the desired back copy.—*Editor.*]

A COMPLIMENT FROM FRANCE

To the Editor of "Motorship,"
Sir:

Please accept my sincere thanks for the December, 1919, copy of "Motorship" which I duly received and read with the greatest pleasure, especially your article about your investigations in France. I wish to express my appreciation of the way in which the details and also photographs are given, and I have no doubt it must have been of great interest to the American readers, as it was also to myself.

Your very truly,
R. BORIS,
Cabinet du Directeur Central Des Constructions Navales.

Ministere De La Marine,
3, Rue Royale,
Paris, France.

BUILDING-UP AN ECONOMICAL MERCHANT MARINE

To the Editor of "Motorship."
Sir:—

If the marine Diesel-engine and Diesel-driven cargo-ship are to become important factors of the American merchant marine this, in my opinion, can only be accomplished on the impetus of private initiative, and it is evident that there are at least a few shipyards and manufacturers who have the clearness of vision to launch out on this new field of activity with the determination that is needed to carry the thing through to a success.

Likewise it is equally unfortunate that there still are a lot of others who are even to-day expecting a fat order to come their way from the Shipping Board, if possible, free from any responsibility on their part, but securing them big profit. It is needless to say that this latter crowd is going to get left, which puts them in the place where they belong, because the building of Diesel-engines and motorships is a matter where intense concentration on very advanced problems of engineering and manufacturing must precede any considerations of profits.

I realize that this ideology does not fit into the principles of the average American business enterprise, but then the Diesel-engine is a matter which stands high above the average, and it takes an organization and people whose mental level is above the average to see its possibilities.

I have enough confidence in the good judgment of American ship-operators to see the advantages of American-built Diesel-ships.

Yours very truly,
H. R. Setz.

Manitowoc, Wis.

CONVERTING PASSENGER VESSEL

To the Editor of "Motorship."

Sir—We are steamboat people, and have read your magazine for some time with very great interest. In your issue of March, 1917, you published an article on a fleet of Russian river-boats engined with Diesel-motors.

In your issue of February, 1919, you published a picture of one of these boats. The caption of that picture says the boat has Diesel motors. She looks to me like a side-wheel boat, and if so, can you tell me how she is arranged? We have an idea she belongs to the same Co. that you speak of in the March 17 issue, but is a *steam*-boat.

Do you know of any boats of our class Diesel engined?

Yours very truly,
Monticello S. S. Co.,
A. T. HATCH,
San Francisco, Cal.

[The Russian passenger-vessel in question is Diesel-driven. There are quite a large fleet of both twin-screw and paddle-vessels on the Russian rivers; but of course, there is no knowing what happened to the ships during the ruling of the Bolsheviki in Russia. You think that these vessels might be steam driven, but this is not the case as the stack is merely used for exhaust-gases and for the donkey-boiler, as you will see by the drawings of the installations on page 14 of the March, 1917, issue.

We note from your post-card that your ships have a speed of about 19 knots. This is rather a

The steamer "Napa Valley," one of the Monticello Co.'s fleet.

higher speed than the majority of Diesel-driven vessels of this class; but, in view of the high-powered and fast-submarines now in service, and also the large high-powered moderate speed cargo-ships in operation, there is no reason why vessels of your type should not be fitted with Diesel engines with every success. In fact, this issue contains an article on the proposed conversion of old U. S. destroyers to Diesel-driven passenger vessels. We suggest that you prepare some details regarding the dimensions of your boats, together with their displacement, horsepower and propeller-speed, and send the same to all the Diesel-engine manufacturers whose advertisements appear in our publication and obtain their recommendations and suggestions. From the information you then receive you will be able to form a good decision.

The installations in the Russian ships seem very well arranged for boats of this class, although instead of using ordinary horse-shoe thrust, we suggest you use Kingsbury type thrust and thus save considerable length of the engine-room space.—Editor.]

A COMPLIMENT FROM ENGLAND

To the Editor of "Motorship,"
Sir:

May I take this opportunity of complimenting you on the very excellent manner in which your journal is produced.

Yours very truly,
CROSSLEY BROS., LTD.,
Per W. L. Webb,
Chief-Engineer and Director.

Openshaw,
Manchester, England.

—AND ANOTHER

To the Editor of "Motorship,"
Sir:

We should again like to congratulate you on the get-up of your magazine.

Yours very truly,
ROBEY & CO., LTD.

Globe Works,
Lincoln, England.

THE MOTORSHIP IN THE U. S. HOUSE OF REPRESENTATIVES

To the Editor of "Motorship,"
Sir:

I have read with interest the editorials published in the January "Motorship." They are along the line of my sentiments in the matter and I am glad to see you push the matter so hard. It has always been a source of great regret to me that we have not had some of these ships tried out with the motors instead of utilizing them as they are.

Yours very truly,
G. W. EDMONDS.

House of Representatives,
Committee on Merchant Marine and Fisheries,
Washington, D.C.

NEW SECRETARY OF COMMERCE ADVOCATES MOTORSHIPS

To the Editor of "Motorship,"
Sir:

The hearings before the Committee on The Merchant Marine and Fisheries when I was chairman of that committee, and when shipping legislation was under consideration, will show that for several years past I have called attention to our shipbuilders and owners of the necessity of making a study of the heavy-oil engined motorship for the purpose of determining the best type of motorship to be used, with a view to increased cargo and economy of operation and that Scandinavian competitors were building ships of that type.

Yours very truly,
J. W. ALEXANDER.

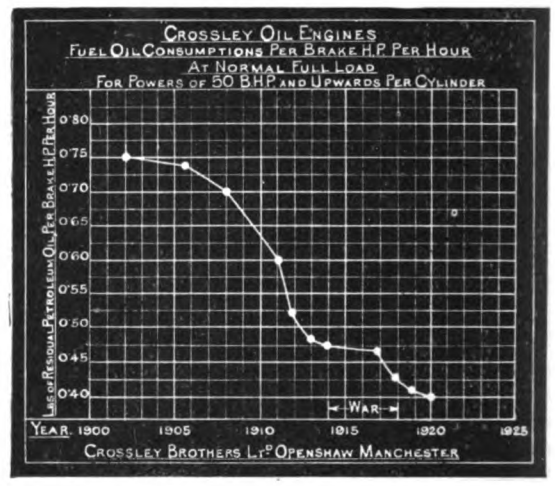
Secretary of Commerce,
Washington, D.C.

FUEL-CONSUMPTION OF THE CROSSLEY ENGINE

To the Editor of "Motorship,"
Sir:

On page 53 of the November issue of your very excellent journal "Motorship" in a paragraph entitled "New Crossley Oil Engine" you have allowed an error to creep in regarding the fuel consumption of this engine, which you give as being 0.425 and 0.475 lbs. respectively for petroleum fuel-oil and tar-oil per I. H. P.

Will you allow us to point out that these figures which were obtained by independent tests, by Professor Burstall and his staff in 1918 were not



per I. H. P. but per B. H. P., a point of great importance as you are aware.

We think you may be also interested to know that the fuel-consumption has since been reduced to 0.400 per B. H. P. and is now being still further lowered.

All these fuel-consumptions are based on single-cylinder engines tested with elaborate accuracy. With multi-cylinder engines the fuel-consumptions *are invariably lower still.* Possibly your readers would be interested in the enclosed curve showing how we have consistently reduced fuel-consumptions since we began the manufacture of engines using crude and residual oils; also how a considerable lowering of the fuel-consumption took place in 1911 to 1913, followed by a long pause during the war and now taking another dive.

Yours faithfully,
W. S. WEBB,
Director and Chief Engineer,
Crossley Bros., Ltd.

Openshaw, Manchester, England.

[The consumptions referred to are remarkably low for the powers, so it is our intention to publish a description of this interesting engine in an early issue.—Editor.]

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THE QUESTION OF AUXILIARY SHIPS

To the Editor of "Motorship",
Sir:—

I have had some experience on auxiliary motor-vessels and cannot altogether agree with your editorials in the February number. As stated in the first item the engines are usually operated continuously. This is a condition that is likely to continue and the engine-room crew will have little time to discuss Bolshevism with the deck crew. There is usually plenty to do down in the small compartment in the stern of the ship. Of course barring trouble there are eight hours off watch, but on many ships this time is necessary to work the carbon monoxide out of the system.

There are various reasons for the many failures such as the engines being overloaded by unsuitable propellers, inexperienced engineers, and faults of the engines themselves. As for the continuous operation the engines are of course needed during calm and head winds, while with fair wind the ship would make little speed with the drag of the wheels if the engines were not kept going. Also the propellers may be helping to drive the ship, though the apparent slip is negative. Under these conditions I do not see any good reason for not keeping the engines going unless there is repair work that must be done.

To make the auxiliary ships a success, improvements in installation, better engineers and improvements in some of the engines used are necessary.

Yours very truly,
CHAS. H. BUSHNELL.

25 Washington St.,
Auburn, N. Y.

To the Editor of "Motorship",
Sir:—

Regarding the blame for the failure of American auxiliary-vessels, I do not think the owners are most to blame, but rather their technical advisers in whatever capacity. The real reason for the failure is not the underpowering alone, nor the undercanvassing, but these two faults together with the twin-screws.

The twin-screws form such a drag as to almost entirely neutralize the gain in speed from the motors. In fact, recent experiments have shown a loss of speed of 25% when under sail. It makes no difference whether the screws are turning loose or not; the resistance is exactly the same, as has been definitely shown by experiments last summer with the German motor auxiliary "Grossherzog Friedrich August." Whatever one may think of the Germans, there is no gainsaying the carefulness of their experiments in every line.

Every sane person will understand the drag of a stationary propeller; but lately it has been found that turning screws have the same resistance! Need more be said about the loss to the shipowner by twin screws? All this the writer predicted in 1916.

Yours very truly,
C. O. LILJEGREN.

Goteborg, Sweden.

FOUR-CYCLE VERSUS TWO-CYCLE DIESEL ENGINES

To the Editor of "Motorship,"

It is not the desire or intention to open up the old controversy of the two-cycle versus the four-cycle engine. The article, however, in March number of "Motorship," titled "Sulzer Two-Cycle Engines and the Propulsion of Cargo Boats," is so misleading and contradictory to actual facts in reference to comparison of the two types that a few comments are considered in order.

For the typical four-cycle illustration a hybrid design is shown, which is most likely to be taken by the casual observer as Burmeister & Wain, and no doubt was the purpose and intent of the authors. It is for this reason that particular exception is taken to the article in question, in justice to these very successful four-cycle builders.

As is common knowledge, there has been a wide difference between claims for two-cycle engines and their actual performances under service conditions. The high mean indicated-pressures are not maintained in service. The reason for this is that for continuous sustained service a certain mean temperature within the cylinder can not be exceeded if internal heat troubles, manifested by cracking and disintegration of the cast-iron surfaces, are to be avoided. To reduce the mean temperature of the two-cycle to that found practical from experience for the four-cycle, the mean indicated-pressure of the former must not be more than about two-thirds that of the latter. This is substantiated from actual performances of two-cycle engines under sea conditions, as will be shown later.

In the sectional drawings showing relative sizes of Sulzer engine and a typical four-cycle engine, to be noted on page 210 of the article, evidently to make the two-cycle appear to best advantage, the four-cycle has been shown to about 15 per cent. larger scale. The relative scales were arrived at from the cylinder diameters given for the particular engines.

From the data given, it will be seen that the M.I.P. for the two-cycle is about 7 atmospheres, and for the four-cycle 6.3 atmospheres, which is computed on a basis of 2,100 I. H. P. per either engine. This assumes that the mechanical efficiency is the same for both, and which is about right, since the two-cycle's scavenging device is independent of the main engines. The M. I. P. of the four-cycle is substantially correct, and the figure is considered good practice and should not be exceeded to avoid heat troubles. For two-cycle, however, this should not be over 4.5 atmospheres for reason as previously specified.

The revolutions for the four-cycle engine are entirely too low. These can be considerably higher than for the two-cycle, for the two-cycle, which is well known, is limited in order to keep the scavenging-pressure low. For the particular size of four-cycle engine the revolutions should be from 100 to 115 instead of 85, which further reduces the size and weight required for this engine. The weight of two four-cycle engines, as illustrated, is given as 876 tons, which is difficult to account for, as two 6-cylinder engines of B. & W. type and of same bore and stroke are only 630 tons complete.

A correct comparison of the two types taking the two-cycle as shown, and its sustained sea power as $2{,}700 \times \frac{4.5 \times 4{,}200}{7}$ I. H. P., would be as follows:

	2-cycle	4-cycle
No. of screws	2	2
R. P. M.	85	135
No. of cylinders per engine	4	6
Bore (m.m.)	680	590
Stroke (m.m.)	1100	900
Weight of two main engines, Com. tons	420	297
Total weight of installation including shafting and propellers, tons	824	594

The only Sulzer motor-vessel on record of any size that has been built and operated for any length of time, is the "Sabara" (formerly the "Monte Penedo", and owned by the Hamburg South American Line), but now belonging to the Brazilian Government. This vessel was built in 1912 add put into service about the same time as the "Suecia," third motor-vessel constructed by Burmeister & Wain, but has seen considerable less service than the latter, due to being interned in a Brazilian port. Since the vessels were built about the same time, and are about the same size, a comparison of the two with their performance over approximately the same number of days at sea in 1919 should prove interesting. The performance data is taken from January number of "Bulletin Technique du Bureau Veritas." This is as follows:

Type	2-cycle "Sabara"	4-cycle "Suecia"
Length between perpendiculars	350 ft.	362 ft.
Beam	50 ft.	51 ft. 3 in.
D. W. Capacity (rated)	6,500	6,550
Sea-Speed, designed (knots)	11	10¾
B. H. P. (designed)	1,700	1,600
R. P. M. (designed)	150	140
Type	Sulzer 2-cycle	B & W 4-cycle
No. of cylinders per engine	4	8
Diameter of cylinders m.m.	470	500
Stroke m.m.	680	660
Time of voyages in 1919	2-4 to 9-23	4-29 to 10-2
Number of days total	231	156
Number of days at sea	109	98
Number of Break-downs	1	0
Number days in port repairing breakdown	31	0
Mean sea-speed from days sea, knots	4.76	8
Total mileage (nautical miles)	12,450	18,780
Ratio of time at sea	1	0.906
Ratio of mileage total, actual	1	1.51

Comments on the above performances are hardly necessary. It shows that the proof of the pudding is in the eating.

Additional instances could be cited in reference to two-cycle installations showing discrepancy between their paper and actual performances. In this connection it is well to draw attention to the Germans' experience with their submarine engines. This field was claimed by the two-cycle builders as particularly their own, due to such adherent advantages as small weight per horsepower, overload, etc. The Germans started out on this hypothesis the first part of the war, but at the end were found to be builders of the four-cycle, exclusively, completely disapproving the arguments in favor of the two-cycle, for this class of work.

The key note to the present undisputed supremacy of the four-cycle engine can be expressed in one word—RELIABILITY.

Yours very truly,
The William Cramp & Sons Ship & Engine Bldg. Company.
Per J. C. SHAW, Asst. to Chief-Engineer.

[In fairness to Sulzer Bros. we should point out that when the breakdown of the engine of the "Sabara" occurred the ship had just been taken over by the Brazilian Govt. from Germany, and a naval college student was made a chief-engineer, because he had read books on Diesel engines. This was told us by the chief-engineer himself.—*Editor.*]

POPULARITY OF MOTORSHIP IN SOUTH AMERICA

To the Editor of "Motorship,"
Sir:

We have received a copy of "Motorship" that you were so kind to send us at the instance of Messrs.————of Seattle.

If you will look carefully through your files you will learn that we have been one of your satisfied subscribers since last year. We are more than pleased with your publication, and under no circumstances will we neglect to renew our subscription at the termination of the present one.

Yours very truly,
Lima, Peru. ENRIQUE LAROZA & CIA.,

To the Editor of "Motorship,"
Sir:

I was much interested in reading your article on Diesel motorships which you prepared for the Senate Committee on Commerce, and I quite agree that it is a subject that ought to receive the careful consideration of the Shipping Board and of shipping men generally. I am much afraid, however, that we cannot expect helpful action on the part of the Shipping Board. The latter seems to be bending its energies toward the sale of its ships at prices which do not, and will not, attract capital. Establishing policies and educating the people to accept them, the board has not yet demonstrated to be one of its proper functions, despite the fact that when the law was passed constituting the board, it was generally understood that was to be one of its functions.

There seems to be no great difficulty in equipping two or three or even more vessels with Diesel-engines, and giving them a thorough test in comparison with other forms of motor power, and I greatly agree with you that the experiment should be undertaken. As to the conversion of vessels already equipped with reciprocating engines, I entertain some doubt, at least until such time as the public mind has received sufficient education.

Any exchange of opinion that will promote education of the American people upon any subject bearing directly upon our merchant marine, I think you will agree, cannot but be an advantage.

I congratulate you on your article and I hope something effective will result from it.

Yours very truly,
N. SUMNER MYRICK.

Chamber of Commerce,
of the United States of America.
Washington, D. C. March 19, 1920.

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"Motorship" Illustrated Patent Record*

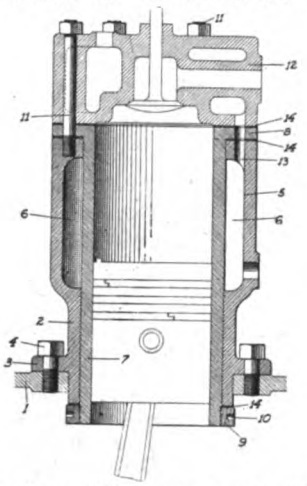
Selected Abstracts of Recent Published Patents of Internal-Combustion Engines

Copies of original specifications may be obtained for ten cents each, by addressing the "Commissioner of Patents, Washington, D. C."

***Compiled and described by H. Schreck, Consulting Diesel Engineer**

1,306,843. June 17, 1919. Engine Cylinder Casting. S. B. Wolgamott, of Stockton, Cal., Assignor of one-half to L. F. Grimsley, of Stockton.

The inventor applies his idea in letters as well as in spirit to small gas engine cylinders which are generally being cast with the cylinder proper and water



jacket in one piece. This arrangement makes a complicated mold and causes substantial loss if one of the cylinders should happen to be porous in the bore. When the cylinders are cast "en bloc," this means an appreciable expense if one of the cylinder bores has been spoiled or is worn out.

The illustration shows very clearly how the inventor arranges his cylinder liner to overcome said disadvantages. This arrangement is not new to the Diesel engineer as it is employed practically on every make of Diesel engine, at least on those of the four-cycle type.

1,318,006. Oct 7, 1919. Fuel Valve.. E. A. Field, Jr., of Grand Rapids, Mich.

This invention refers to a modification of the well-known Hvid or Brons motor, on which the fuel is not directly injected into the cylinder, but into a receptacle or cup 11 from which the fuel is blasted by a preliminary explosion into the cylinder. The novelty of this invention is the sleeve 20 which controls the time of delivery of the charge with respect to the compression stroke of the piston.

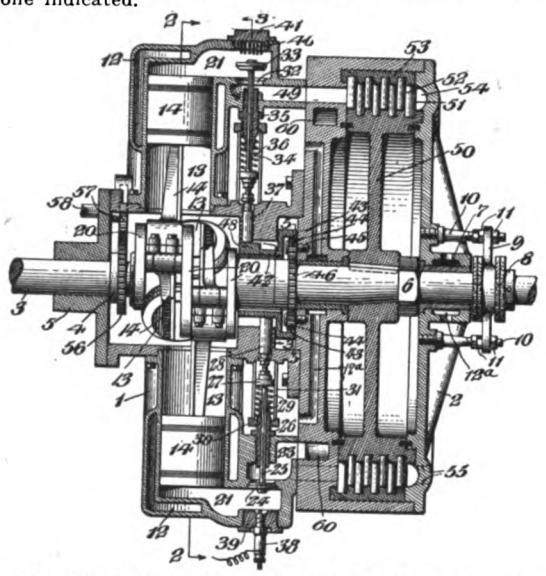
The fuel is connected and fed into the channel 6 and a reciprocating plunger 9 forces same through the valve 13. This valve is normally held closed by the spring 15, which tension is controlled by the motion of the end of a rocking lever 16 which is actuated by the camshaft. It may be mentioned that for the operation of one cylinder one inlet, one exhaust valve, one fuel plunger, one needle valve and one controlling sleeve must be actuated.

1,322,577. Nov. 25, 1919. Turbine Gas Engine. W. G. Johnston, of Philadelphia, Assignor to H. A. Penrose, of Quinby, Va.

This invention refers to a combination of a reciprocating engine and a gas turbine which is operated on the exhaust gases of the former.

The inventor has attached to the front face of a turbine casing six working cylinders, being arranged in a star form, that is, the axis of the cylinders are at 60 degrees to one another. The shaft has two cranks, to one of which is connected every second connecting rod, that is, each three connecting rods are linked to one crank.

At the annular space 60, the fuel or gas mixture is admitted. Its operation of the pistons is controlled by the inlet valves 24, and the exhaust valves 53. These valves are actuated by the cams 48 and 42, and the cam body is in turn actuated by the gears 44 and 46. The exhaust valve 33 and inlet valve 24 of each cylinder are located side by side and the inventor claims, that due to the radiator 40, this invention is particularly adapted to be used with crude oil as fuel. However, the inventor may find some difficulty in burning crude oil in a combustion chamber as the one indicated.

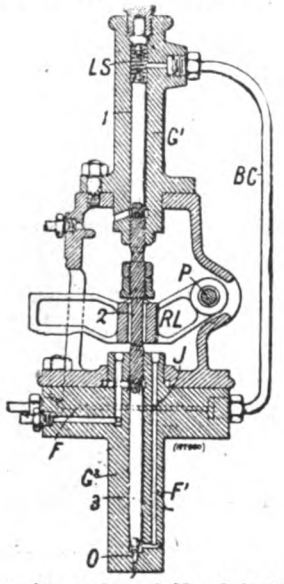


The burnt gases flow through channel 49 to the turbine buckets 51 of the rotor 50 and finally exhaust into the port 54. The end thrust of the turbine is taken up by the ball bearing .

127,980. June 11, 1918. Injection Valve. R. P. Doxford and K. O. Keller, both of Sunderland (Britisn Patent).

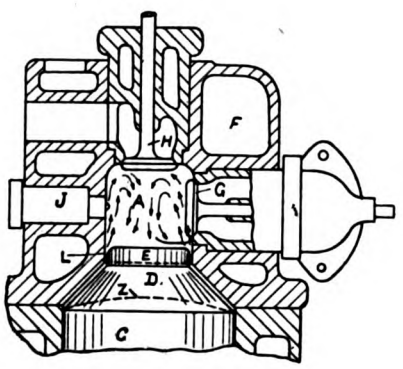
This invention relates to fuel injection valves for oil engines, and has for its object to eliminate the heavy valve spring and to reduce the great length of the valve needle, such as is generally used now and which is hard to keep straight.

The needle valve is split up into three parts, No. 1 is the upper part or pilot ram, No. 2 is the middle



part or the pusher rod, and No. 3 is the lower part or the valve proper. The parts 1 and 3, the former being slightly larger in diameter than the latter, are abut against the part 2. The fuel enters at F and a pipe BC, which is a pressure-equalizing conduit, maintains constant communication of the top end of the upper cylinder with the lower valve housing which is under the constant pressure of the fuel oil source.

Fig. 1.



1,320,450. Nov. 4, 1919. Combustion Chamber. K. I. Crosley and W. Le P. Webb, both of Openshaw, Manchester, England.

This invention relates to a novel design of a combustion chamber for gas and oil engines, being more particularly suitable for vertical engines.

The entrance to the combustion chamber from the cylinder and also the end of the oil engine piston which projects into the combustion chamber are circular in form and are of a diameter about equal to half the bore of the cylinder. The circular form is preferred for reasons of machining. When this combustion chamber is used on a gas engine and therefore a lower compression pressure required, the projection on the top of the piston is eliminated.

The inlet valve G and the fuel valve J are arranged horizontal and at diametrically opposite points. The exhaust valve H, however, is arranged vertical in order to prevent any undue wear of the spindle or its guide and consequent defective valve operation such as might occur if the spindle is horizontal.

The inventors claim two principal advantages of this design, first, the projection of the piston into the combustion chamber raises the compression and causes a turbulent swirling effect of the oil spray and, second, by the peculiar relative location of exhaust and inlet valve and these both being open for a short interval at the end of the exhaust stroke, the scavenging of the combustion chamber is improved considerably.

1,321,580. Nov. 11, 1919. Valve Structure. A. Winton, of Lakewood, Ohio.

This patent covers the well-known and in the literature quite often illustrated valve gear on the Winton Diesel engine.

On this engine are arranged on each cylinder head each two exhaust and two inlet valves. Tne accompanying cut represents such a pair of valves of either

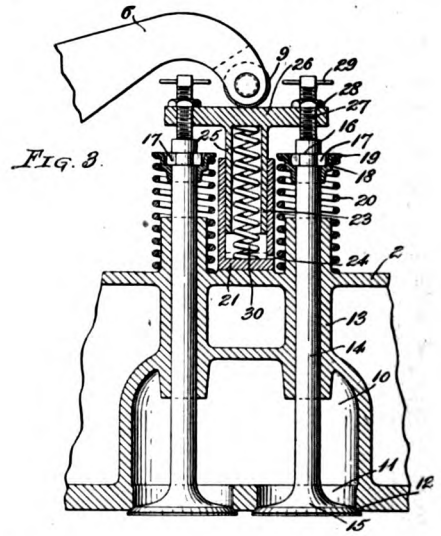


Fig. 3.

kind and indicates clearly how these valves are actuated by means of the common rocker arm 6.

It might be recalled that the use of a pair of valves for intake and exhaust and each pair operated by one rocker arm is not new, but in use on a number of engines. The arrangement has decisive advantages.

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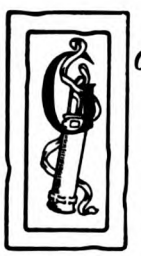

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